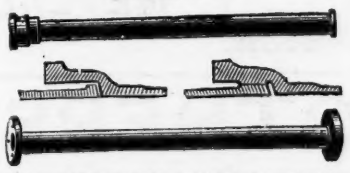
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1818.] LONDON, MARCH 15, 1898. [50TH YEAR. PRICE 6d.

GAS AND WATER PIPES
1¼ to 12 IN. BORE.



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LANEMARK CANNEL AND GAS COALS.
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NEW CUMNOCK, N.B.
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INCANDESCENT STREET LAMPS A SPECIALITY.

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49, FANN STREET,
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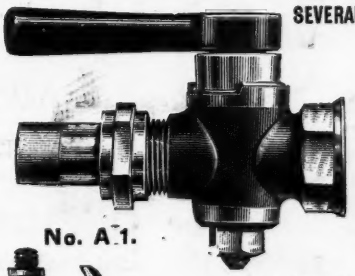
FULL-WAY MAIN TAPS & LANTERN TAPS.
SEVERAL DESIGNS SHOWN BELOW.



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THESE TAPS ARE
FULL-WAY
AS SHOWN.
SUPERIOR QUALITY AND FINISH IN GUN METAL.

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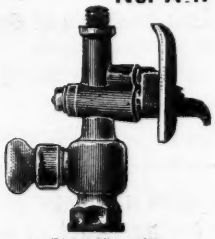
LANTERN TAPS.



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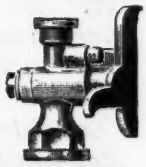

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No. A 11.

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THE UNVARYING WATER-LINE GAS-METER,

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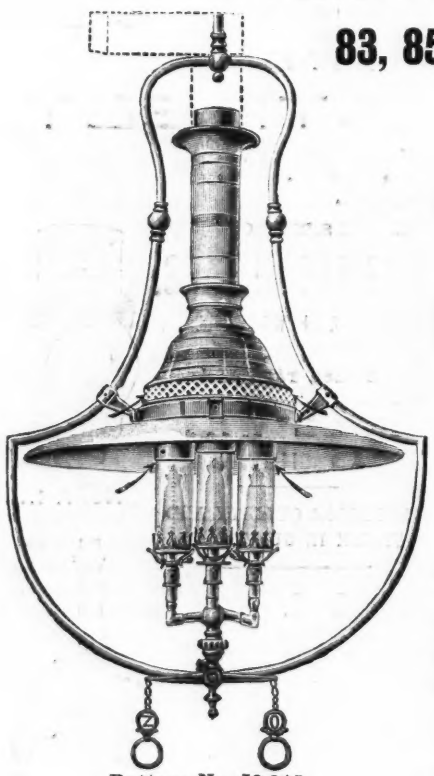

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FOR INCANDESCENT GAS-LIGHT.

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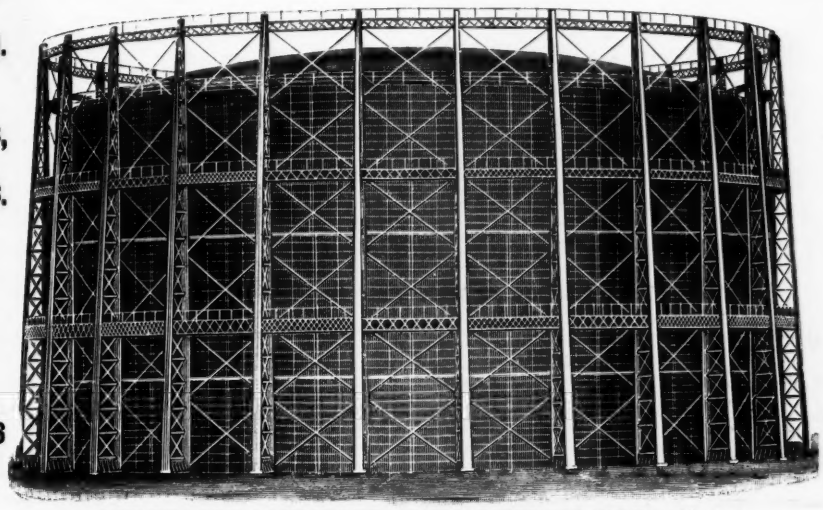

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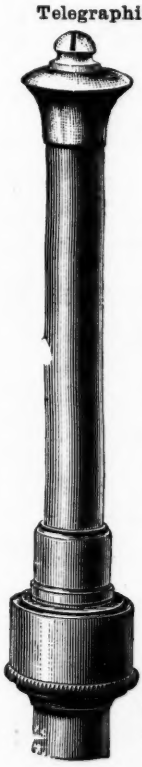

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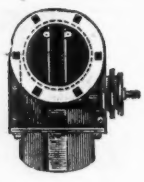

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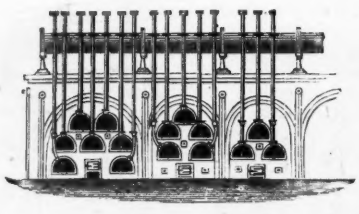

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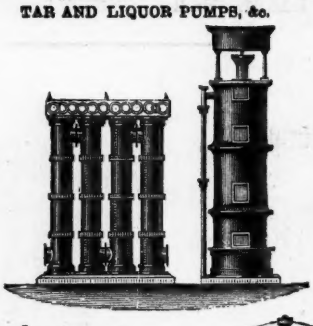

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PURIFIERS with Planed Joints,
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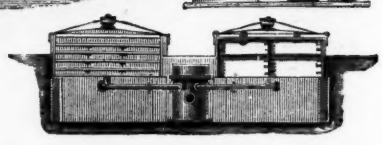

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Analysis: 12,600 Feet of 19-Candle Gas per Ton.

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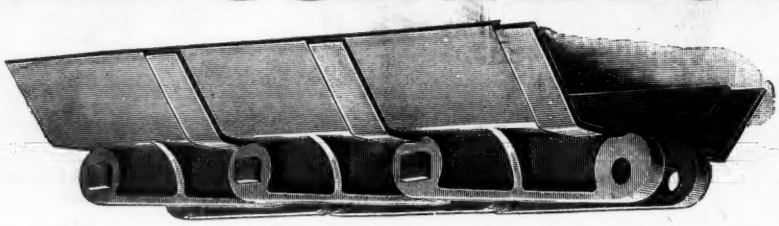

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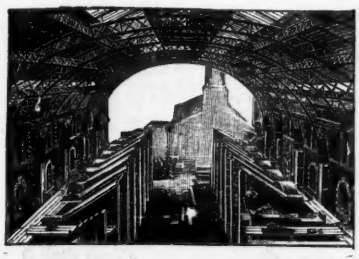

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All sizes,
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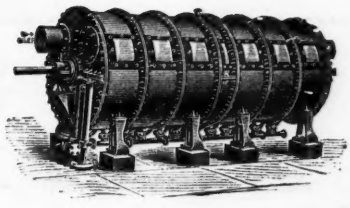

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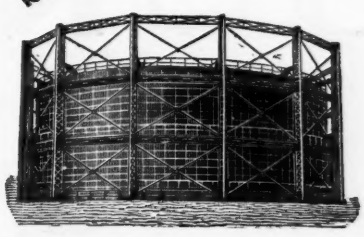

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Rotary or Pump
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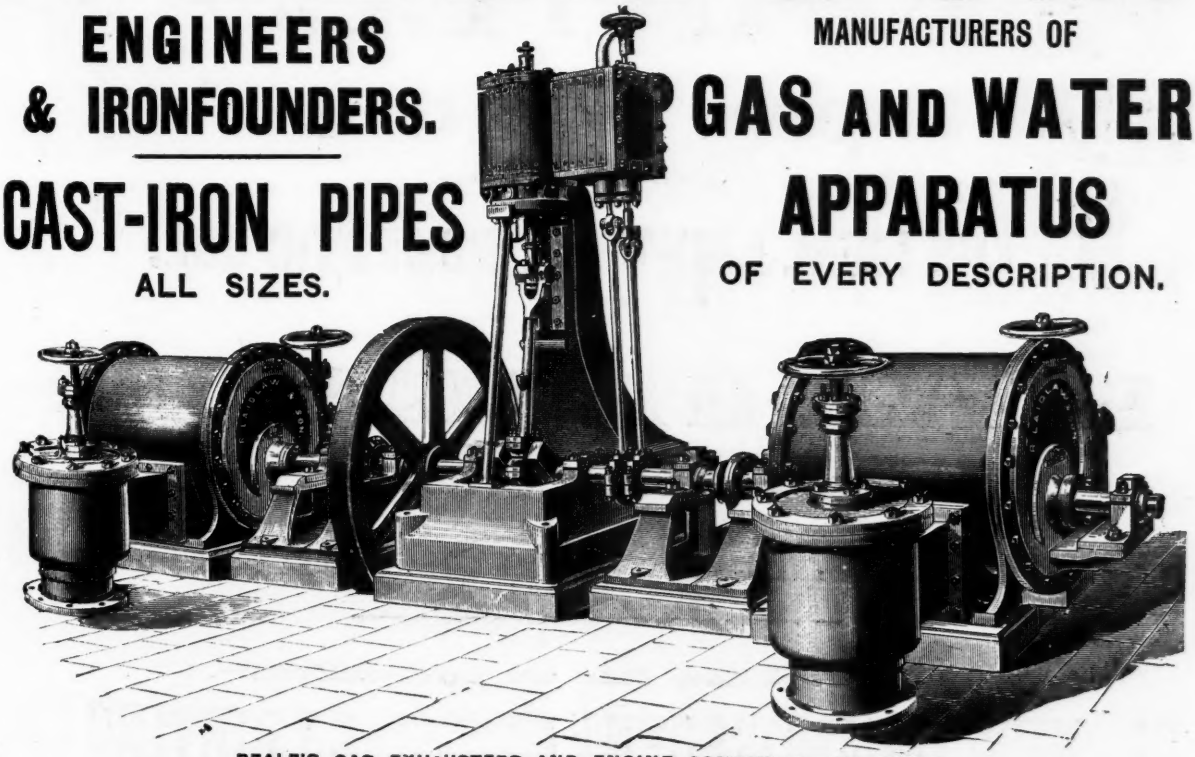

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NEW POPULAR PRICES.

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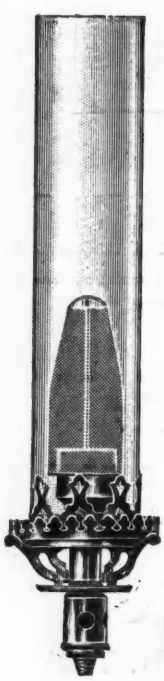

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WITH BYE-PASS, 5/-.

MANTLES

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THE IDEAL LIGHT FOR DOMESTIC USE.

SUNLIGHT MANTLES

PRODUCE A DIFFUSED LIGHT OF SOFT RAYS,

The NEAREST APPROACH to the LIGHT of the SUN.

Price Lists, &c., on application.

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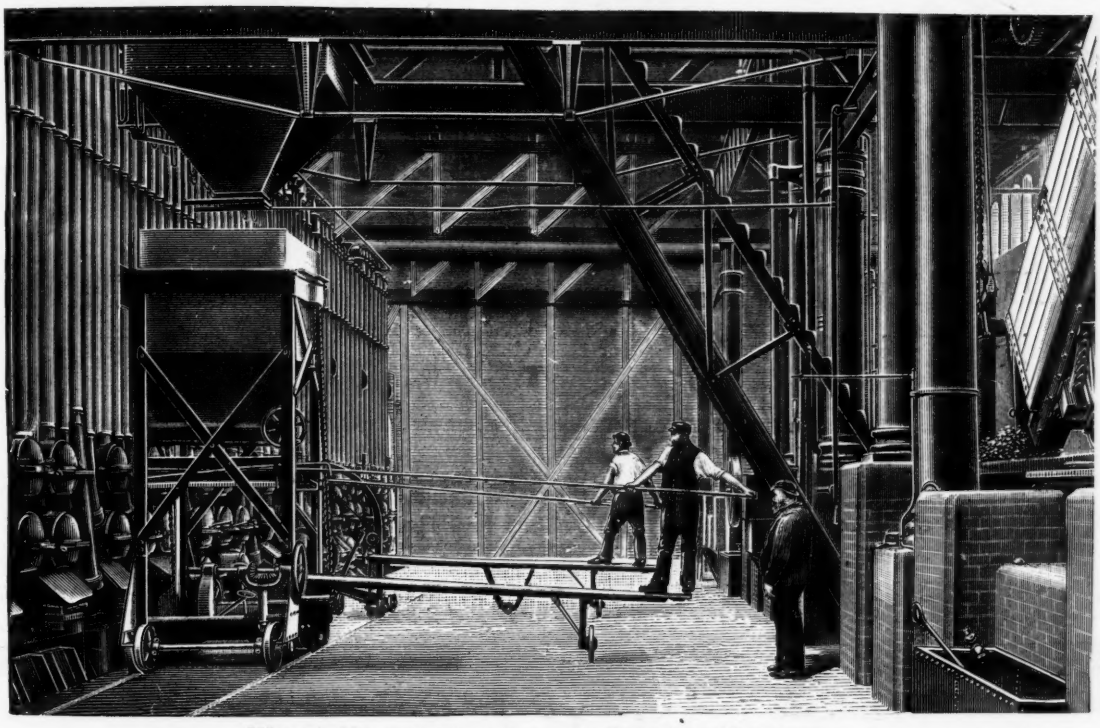

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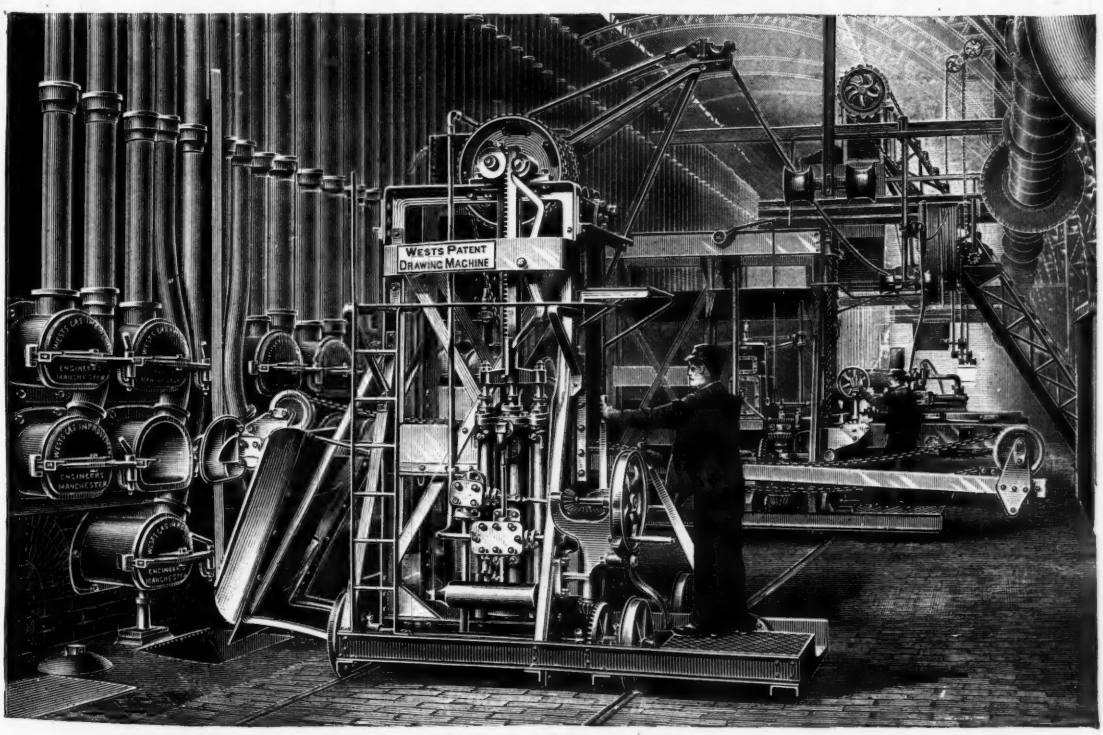

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PREPAYMENT GAS-METER

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THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
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8. Index showing number of Pennies in the mechanism at any time.
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GUARANTEED FOR FIVE YEARS.

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IMPROVEMENTS IN STREET LIGHTING.

Highest Efficiency with Greatest Economy.

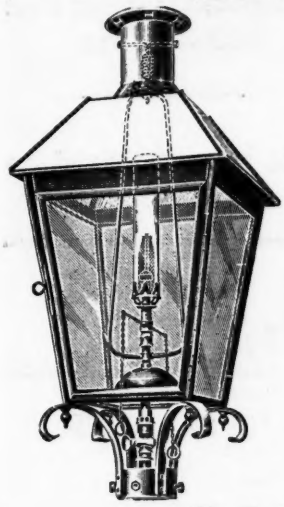
LIGHTING AUTHORITIES, GAS ENGINEERS, and GAS MANAGERS

are invited to inspect the

INCANDESCENT GAS-LIGHT

(Welsbach System),

which has now been successfully adapted to the purposes of

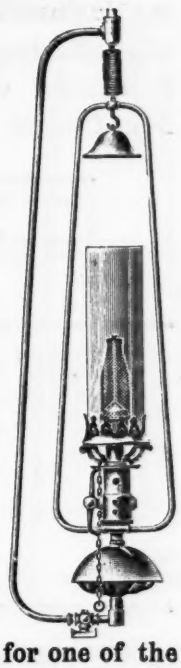


STREET LIGHTING,

the difficulties caused by VIBRATION having been OVERCOME by the use of the

NEW SPRING SUSPENSION FRAME (Patent).

This System of Lighting meets the requirements of all Lighting Authorities in those Districts where it is desired to effect an Improvement in Street Lighting WITHOUT INCREASE OF EXPENDITURE.



The following are Extracts from a PAPER read by Mr. F. G. DEXTER, before the SOUTHERN DISTRICT ASSOCIATION.

"The success of the experimental (Welsbach) lighting secured the contract for one of the Parish Council Districts; and this was shortly followed by the contract for three years for the city lamps. The total represents altogether about 500 single lamps, and 15 refuge lamps containing two lights."

"In the matter of maintenance of the street lights, the record is favourable—in fact, more so than the estimate provided. By the test-meter, the average daily consumption works out to 38 cubic feet per light, including bye-pass. The bye-pass consumes with a flame half an inch long, $\frac{1}{5}$ foot per hour. This represents 1000 cubic feet per lamp per annum. The average consumption per light, when in use, works out to 12,900 feet per annum, or about $3\frac{3}{5}$ feet per light per hour. The lighting is continued all the year round, from the average times of one hour after sunset to one hour before sunrise."

"The mantles have worked out to an average of three per lamp per annum; but, bearing in mind the absence of frost last winter, the writer believes that four mantles per light is more likely to represent average conditions."

"In the matter of cleaning, it may be said that the lanterns require less attention than with the ordinary flat-flame burner."

"The number of lights attended to per man averages 85."

"The 'Welsbach' Light is undoubtedly one of the greatest aids to successful competition that the Gas Industry has ever experienced. Its influence, while reducing the relative cost of light, has advanced the consumption of gas all over the country by the increased satisfaction of the existing consumers, and the attraction of others. The writer feels that its influence should not be confined to the house. It is capable of meeting every competitor in the street, from cheap oils to arc lights, in cost and in effect; and it is hoped that the foregoing experience may lead many others to seek its aid and to realize its efficiency."

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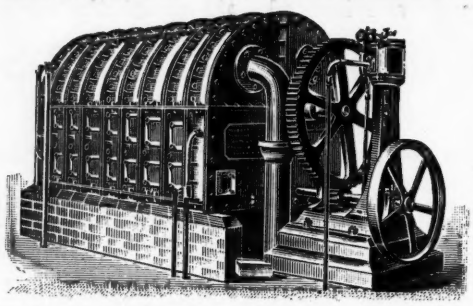
Palmer Street, Westminster, London.

KIRKHAM, HULETT, & CHANDLER, Ld.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

PATENT "STANDARD" WASHER-SCRUBBER.

This Apparatus upholds its title, the "STANDARD;" being recognized by leading Engineers as the most efficient Apparatus for the Extraction of Ammonia from Coal or other Gases.



The Largest Order ever given for WASHER-SCRUBBERS was recently received being for **16** Patent "Standard" Washer-Scrubbers, each for 3,500,000 Cubic Feet of Gas per day.

Number of Patent "STANDARD" Washer-Scrubbers in use at this date

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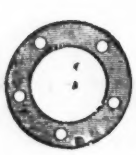

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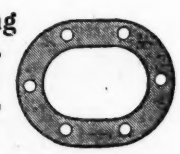

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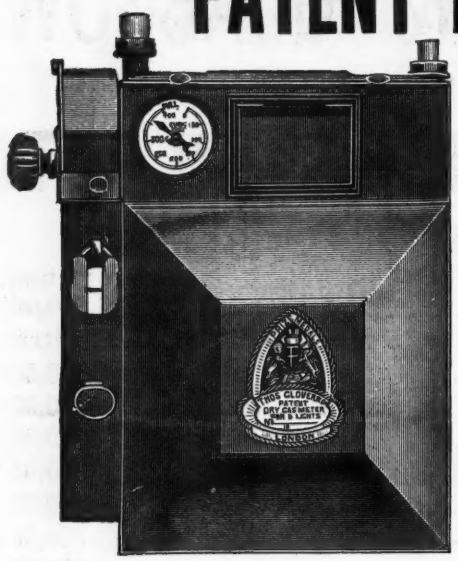

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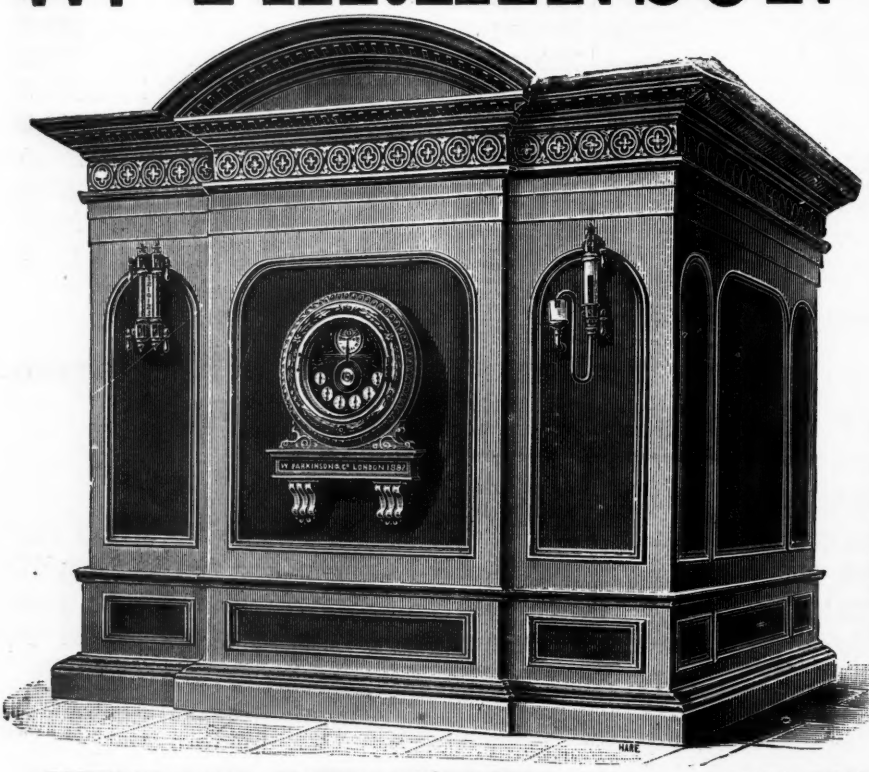

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EDITORIAL NOTES.

Second Reading of The Gaslight and Coke Company's Bill.

THE Bill of The Gaslight and Coke Company came on for second reading in the House of Commons on Thursday, and was opposed, according to notice, by Mr. Pickersgill. After a debate which will be found fully reported in our "Parliamentary Intelligence" to-day, the second reading was carried by 171 to 89 votes. Consequently, the Bill will go before a Select Committee in the usual course, which is the only proper way of dealing with such a measure. In moving that the Bill be read a second time that day six months, Mr. Pickersgill had to confess that, regarded as a proposal for the unification of stocks, he could have had little to say against the measure. His main objection was to what he was pleased to call the "watering of the stock"—meaning its conversion upon a 4 per cent. basis. Of course, the term was misapplied. Stock watering means simply increasing the nominal amount of a stock without altering the rate of dividend payable on the whole, which is the exact contrary to the proposal of this and every other similar Bill submitted to Parliament by a Gas Company. The term is a catching one, however; and accordingly it was used to prejudice the House against the Bill. Generally, Mr. Pickersgill based his amendment on arguments made familiar by Mr. De la Hooke. The second reading was supported by Mr. Banbury, who protested against Mr. Pickersgill's misdescription of the Company's proposal, and also by Mr. Kimber. Opposed by two members of the London County Council, and defended by a third, the Bill was commended in principle by Sir James Joicey and Mr. W. Woodall; the latter making a strong appeal for pursuing the usual course of "sending it upstairs," where the points of detail with which it bristled could be properly dealt with on the merits.

All the members who took part in the discussion spoke fairly to the point, with the solitary exception of Mr. Lough, who talked a mass of nonsense about the Bill being the outcome of a conspiracy between the coal owners and the Gas Company, and advanced the amazing argument that the House ought to reject the Bill on the score of the "unpopularity" of the Company. This is the taint of Jacobinism that makes "Progressive" politicians in their turn "unpopular" with people who pay rates and have money to lose. Mr. Lough is not a member of the London County Council, but represents West Islington in Parliament. Probably his tirade did more than anything else to persuade the House that the Bill contained things which the ordinary member could not be expected to understand without the enlightenment of an inquiry by a Select Committee. The House has done the right thing by the Bill; while the Company are to be congratulated on having successfully passed one formidable obstacle in their parliamentary course.

The Morrow of the London County Council Election.

THE process of explaining and commenting upon the result of the London County Council election has been going on all the week in the leading London newspapers. We have noticed nothing in these comments to qualify the conclusion expressed in this regard last week—that, broadly speaking, where the voters pay their own rates they voted Moderate, and where the rates are hidden in the rent they espoused the more adventurous Progressive cause. This is the view favoured by Mr. R. M. Beachcroft, the Vice-Chairman of the last Council, who also believes that the Moderate party suffered as a whole from the prevalence of a suspicion that they were not hearty in the service of the Council. Unquestionably, however, the indirect ratepaying voters dominated the election. Of course, these voters will be the first and greatest sufferers if the rates go up; for the landlords will then charge them twopence extra in their rent for every penny increase of the rating. Meanwhile, the new Council is at liberty to "progress" for three years, thanks both to those voters who did not vote and to those who did. The average Londoner probably thinks, if he thinks about it at all, that it does not matter. He has a cynical notion that his rates are pretty sure to rise, whoever has the spending of them. It is useless to reproach him for his indifference, or tell him he ought to do as they do in Birmingham and other places where the spirit of local self-government is alive.

Perhaps he was a Birmingham man himself once, and took an interest in local affairs; but since he came to London it has been different.

The victors in the late struggle have held their first "caucus" meeting to choose their nominees for the chief posts in the Council. There was some preliminary talk on the subject, in which it was suggested that the majority were disposed to be magnanimous, and offer some of the dignities of the Council to representatives of the minority. It transpired, however, that the latter were not anxious to occupy positions of mere ornament, without having any corresponding power. Some fears were expressed on the morrow of the election that the Moderates might sulk, and allow their opponents to do their best or their worst with the powers placed in their hands. This was an unworthy suspicion, which a few words from Lord Onslow sufficed to dispel. The members of the London County Council have their party divisions, whether this is for good or for evil; but they are all returned to a position of high and honourable distinction, if they will only make it so by doing diligently, fairly, and fearlessly the public work committed to their charge. A good many foolish things were said about the aims of the parties in the Council before and for the purpose of the election; but all that is over. What remains is the work; and there is plenty of it. If the work of the Council is well and truly done, the "man "in the street" may, in the course of time, get to know the fact by the complaisance of the newspapers; and the result may be a growth of that municipal spirit in respect of which London has been so barren ever since the City ceased to be responsible for the town.

An American's Notes on the British and European Gas Industry.

One lives and learns; and one of the things that one learns as the pathway of life lengthens is the untrustworthiness of some general opinions. It is a commonplace of English opinion, for example, that America is the country *par excellence* of labour-saving mechanical devices. American technical publications favour this idea by the assiduity with which they publish descriptions of all varieties of machines for enabling the true American to sit down at work that people of other less ingenious nationalities have to do while standing up. Much of the excellent American machinery and industrial plant that gets into the English market is of this kind. If the average Englishman were asked what is his general notion of the character of American industrial methods, he would probably reply to the effect that he supposes them to be more labour-saving than those with which he is familiar at home. This being so, it must have been a little surprising to the untravelled British gas manager to read in the "Journal" last week the account given to the New England Association of Gas Managers by Mr. Walter S. Allen, erstwhile Secretary of the Board of Gas Commissioners of Massachusetts, of his visit to Europe.

The first thing about the English gas industry that impressed this very capable and candid observer when he came among us last year was "that gas managers make "much greater efforts to do away with manual labour than "is the case in America." This is a truly remarkable observation. Again: "Much more attention is paid to "mechanical methods of handling coal than is done in "America." Well, well! But Mr. Allen discovers some palliation for American remissness in this regard in the smallness of the gas-works appertaining to most American cities. The excuse only raises another question, which is, why such works are smaller than those required by European cities having equal populations. It is matter for surprise that Mr. Allen, for whom the subject of the saving of labour in gas-works had a great fascination, did not manage to catch sight of an inclined retort in operation during his visit. If he had done so, he might have made less of the point that "there is one serious draw-"back to the inclined retort, and that is the proper angle "for setting it." What Mr. Allen means is that the proper angle is difficult to ascertain, and is not the same for the different kinds of coal that go into one and the same gas-works. His criticism is wholly hypothetical, and he should not have raised the point without adducing evidence to prove that there is in fact such a "drawback" to the use of the inclined retort, and that it is a serious one. As it is, he is a little too didactic on this head. As regards the comparative burden of carbonizing wages in this country and in the United States, Mr. Allen shows that the peculiar British institution denominated the eight-hour shift nearly equalizes matters for both sides of the Atlantic. Apparently it is useless for the "eight-hour legal day" men to think of starting an American branch. The American workman of all descriptions prefers to work a long day, and get the corresponding amount of wages.

Mr. Allen's observations upon the different conditions under which the gas industry is carried on in the United States, on the Continent, and in England are replete with interest. He records and comments intelligently upon the varying fortunes of the gas-engine and the incandescent gas-burner in these different countries. It must not be regarded as meant unkindly, or spoken in a depreciatory spirit, if we remark upon this that his comparisons give one the idea that in his own country the gas industry is less developed, and that the American people have missed much of the benefit of gas which others enjoy. He is not the first to notice that at meetings of technical societies English gas engineers and managers interest themselves in topics which are never heard of at similar gatherings in the United States. He probes what is a weak spot in the municipalized division of the British gas industry—the degradation of the manager; and he applauds the modern system of British gas company finance. Altogether, Mr. Allen's paper is as instructive for British as for American readers. We are sure he will desire no higher compliment.

The Organization of the Local Government Board.

A good deal of interest attaches to the First Report of the Local Government Board Inquiry Committee, just published as a Parliamentary Paper. It is unnecessary for us to explain to the bulk of our readers the nature and functions of the Local Government Board; but we take the opportunity of commending this report to the particular attention of Foreign and American students of the English system of local self-government. In England we have essayed the experiment of keeping a strictly middle course between the centralized system of France, where "M. le Préfet" has a finger in all local business, and the laxity of the United States, where every township is a law unto itself. The agency by means of which this experiment is carried out is the Local Government Board—a Department of State which has grown from small beginnings into a large organization of many ramifications. In matters of government it is the English custom to let systems grow as necessity compels; which involves periodical adjustments of means to ends. For a long time past it has been recognized that the arrangements of the Local Government Board needed overhauling. Fresh responsibilities are continually being thrust upon the Board, which have to be dealt with by means originally intended to serve other purposes; and a mass of old routine work has still been left to the Board which might with advantage be entrusted to the great Local Authorities which have grown up under its general supervision. Consequently, by an arrangement between the President of the Board and the Chancellor of the Exchequer, a Committee was appointed to "inquire into "the sufficiency of the clerical staff and secretariat of the "Local Government Board, having regard to the duties "devolving on the Board, and into the existing divisions "of the work, the salaries of the officers, and the organiza-"tion of the Department generally, and to recommend "what changes should be made in the existing arrange-"ments." The Committee have reported on the first portion of this reference, relating to office reorganization; the latter part, involving the consideration of schemes of devolution, is to form the subject of a second report.

The last reorganization of the Department took place in 1884; and the arrangements then made would still have remained satisfactory but for the enormous increase of work thrown upon the Department by subsequent legislation and Orders in Council. The Local Government Acts of 1888 and 1894 put a great strain upon the Department, especially in regard to the financial supervision of the new Local Councils and Municipal Corporations. Complaints of the dilatoriness of the office are rife; but some excuse for this may be found in the fact that "the number of "letters received and registered increased from 119,000 in "1885 to 168,000 in 1896." The number of local inquiries held by the Engineering Inspectors of the Board in 1896 was more than double that for 1889. "The amount of "the outstanding debt in respect of which Local Authori-"ties are required to make an annual return, with a "view to its being ascertained that proper provision is "being made for repayment, was £40,000,000 in 1883, "and it now exceeds £102,000,000." These are very big

figures. The Department has had so much to do of late that the work in several categories has fallen into arrear. One of the most troublesome of these batches of arrears is that of the local inquiries for loans. "At the end of "1896, more than a hundred cases for local inquiries by "Engineering Inspectors with regard to applications for "sanction to loans were unallotted to Inspectors, in conse- "quence of the cases already assigned to them not having "been disposed of; and there has also been much delay in "dealing with cases in the Department after the Inspec- "tors have made their reports." This is a confession that Local Authorities will be well advised to note for their future guidance.

It is not for us to discuss details of office organization revealed in this report. But it is satisfactory to learn that, in order to deal with the serious arrears of this branch, the Treasury has sanctioned the appointment for twelve months of an additional supervising Engineering Inspector and two Inspectors.

WATER AND SANITARY AFFAIRS.

In resuming his evidence before the Royal Commission on the Metropolitan Water Supply last week, Mr. W. H. Dickinson proceeded to withdraw the private memorandum which he produced at the previous meeting. He explained that the calculations which it contained were "not very serious ones." Whether they were so or not, the parties present when Mr. Dickinson fled from his figures were rather amused at the incident; and there was laughter in the place of meeting at the Westminster Town Hall. The Chairman (Viscount Llandaff) wanted to know how Mr. Dickinson had arrived at the conclusion that, if the water undertakings were purchased at the price of £30,000,000, the water-rates of London would be raised by 30 per cent. The only explanation Mr. Dickinson had to offer was that he took the repayment at 60 years, whereas if Parliament extended the period to 100 years, "that "would make an immense difference to the rates." We have before observed that this redemption of capital is peculiar to municipal finance, and is foreign to the very existence of a water company. The process in London is left in some mysterious manner to the City Chamberlain. Even Mr. Dickinson seems to have got into a fog over the matter, and so has rushed out of it. Had he known that in writing this memorandum he was to be cross-examined upon it by Counsel, he says he would have been "very "much more careful." After all, despite his modest opinion of his memorandum, Mr. Dickinson may be taken as correct when estimating that if the water-works change hands the water-rates will rise. The Chairman understood him to be still of opinion that the purchaser of the undertakings would have to incur almost immediately an expenditure of not much less than £20,000,000. Mr. Dickinson replied that £15,000,000 or £16,000,000 would be sufficient at first. It remains clear that, if the County Council get possession of the water supply, the ratepayer will, sooner or later, if not "immediately," feel the difference in an increased charge. It will assuredly be to his interest to let matters rest where they are.

"Why not try control with such powers as you have?" was General Scott's suggestion as between the County Council and the Water Companies. The Council had gone on for nine years, and had allowed their powers of control over the Companies to remain in abeyance. Two reasons were given for this inaction—one being that the Companies had performed their duties so much more satisfactorily since the Council had come into existence. Another reason, equally humorous, was that to proceed by prosecution was not satisfactory. That is to say, as suggested by the Chairman, that when prosecuting a Company the Council would have to prove their case. This, no doubt, is the reason why the Council have failed to exercise the enlarged powers for penalizing the Water Companies which have been created by the Metropolis Water Act of last year. The Council are stated to have sent forth their emissaries, but the consumers have not yet seen fit to make any complaint as provided for by the Act. Mr. Dickinson says the Council have no staff for making the necessary investigations to ascertain when the Act is infringed. Yet the Vestries and District Boards are not without Sanitary Inspectors, who might easily look into the matter, but whose discoveries would inevitably show that the defects of the water supply were primarily due to the landlords and householders, and not to the Water Companies. This, again, would not be "satisfactory." It is argued that there is "no finality" in control. There seems, indeed, to be no beginning to it. It is not what the Council want; and we see it is confessed by Mr. Dickinson that the Companies have so improved in their manners that there is little need now to look after them. There is much that is amusing in this witness's evidence; and one passage of this nature is that wherein Mr. Dickinson is asked, seeing that he believes purchase would settle every difficulty, whether on the transfer taking place he would leave the municipal authority entirely without control in respect to the water supply. His response implied some degree of surprise at such a question, to which the all-sufficient answer was a decided affirmative. How far the authority at Spring Gardens thinks to stand above the law appears in the kind of arbitration which is to settle the terms of purchase for the water undertakings. The arbitrators are not to be precluded by any "legal objections" from taking into consideration the contentions of either party. Viscount Llandaff pointed out that this would clearly entitle the arbitrators to disregard an Act of Parliament. But one thing is made further evident by Mr. Dickinson's statements—that the purchase of the water undertakings by the County Council must increase the charge to the consumer, unless Parliament allowed the suspension of the sinking fund for a few years. On the whole, the purchase of the water undertakings, according to the plan laid down by the Council, is certainly fraught with the promise of a financial muddle.

In the debate on the second reading of the Southwark and Vauxhall Water Bill in the House of Commons last week, Sir F. Dixon-Hartland made a bold and open declaration, which naturally carried weight with it, considering the speaker's position as Chairman of the Thames Conservancy Board. The House were told that the supply of water for navigation was what the Conservators considered of the greatest importance; and if this was rendered secure, they admitted the claim of the Water Companies to take what was left, or so much as they needed. This puts the case as clearly as it can be stated. The Conservators may be trusted to take care of the navigation; and if there is water enough for this purpose as well as for the Companies, the interests that are vital are at once secured. As for the sufficiency, this depends to a certain extent on the means employed. Sir F. Dixon-Hartland stated that the Conservators were clear upon this point—that there was enough water in the Thames for the whole population of London "for the next hundred years," if it were only taken in the proper way. But then, as the speaker remarked, the policy of the London County Council required that the water for the Metropolitan area should be obtained from some other source than the Thames. Why should another source be sought for? One argument advanced has been that the Companies would "denude the Thames." Sir F. Dixon-Hartland, who is a species of guardian for the river, fears nothing of the kind, providing a proper system of storage is adopted. The yearly discharge from the Thames is unquestionably in excess of requirements, and the task to be performed by the engineer consists in catching the water at the right time. It is a physical problem; but the County Council have made it a matter of Progressive "policy." Of course, the Thames does not supply all London. There is the Lea, and there are the wells. Starting with the principle espoused by Sir F. Dixon-Hartland, Parliament simply has to stipulate that the proper means shall be devised whereby the Water Companies shall draw what they want without detriment to the stream. Mr. Stuart told the House that the Southwark and Vauxhall Bill, taken in conjunction with the Staines Reservoirs Scheme, "would "practically denude the Thames of water." Constructing reservoirs is just the way to prevent such a result. By these means it is provided that water which otherwise would create a flood, or run prematurely into the sea, shall be retained for the use of London. It would not be difficult to show that at the present time the operations of the Water Companies, in conjunction with the Conservators, are of immense advantage to the river. It will be a very dismal day for the Thames if ever it should come to pass that the Companies have to forsake the stream, and the Conservators lose the handsome revenue by which they are enabled to keep the river clean and in good order.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 607.)

THE Stock Exchange has had a really bad week, without a glimmer of sunshine throughout the whole range of the markets. It had a tempestuous opening; and from Cuba in the far west to China in the far east, the air was full of fear of war. Coming upon already weakened markets, the reported illness of the Queen on Tuesday had a most alarming effect. Although this new terror was happily soon dismissed, yet the other remained to the last; and the week closed very heavily. The situation gravely affected the settlement. Everyone wanted to close accounts, and money was most difficult to get—bankers looking sharply at their security. Only one failure was reported by Saturday night; but it is believed that there are some serious squeezes not yet relaxed. Prices, of course, are much lower all round. Markets not directly affected have suffered to an extent in sympathy, and the Gas Market among the rest. Interest has centred almost entirely in Gaslight "A," the transactions in which have been unusually extensive. The stock has had a very curious and chequered career. It opened weak on Monday, and had a big fall. It went worse on Tuesday, and changed hands once at 282, which was 13½ below the closing figure the preceding week! Then it steadied, and on Thursday began to rebound hugely. It gained 5 that day, and 6 the next; marking 298 on Friday—a jump of 16! And all this recovery is said to have been founded on the *debût* of the Company's Bill before the Commons, revealing possibilities of that beloved object of the markets, Stock-splitting. This is not the time nor the place for us to forecast the chances of the Bill going through; but we can only marvel at the slender foundation for so much speculative activity. South Metropolitan had an unusual experience—a smart fall. This was quite devoid of meaning as regards the Company's position and prospects; and we understood it arose from a large amount of stock coming upon the market in a semi-panicky week, when most of the buyers were fighting shy of everything. Commercials made no sign. The Suburban and Provincial division enjoyed their usual repose; but some indication of their sleeping strength was afforded by the *ex div.* quotations of Bromley and Tottenham. The Continentals had a bad time. Foremost was Union, with a drop of 12½. Imperial fell at first, but had a smart recovery later on. European went back a little in sympathy with the prevailing tone. None of the rest were conspicuous. The Water Companies were dull; and most of them had a drop—attributable probably to apprehension of Progressive hostility.

The daily operations were: Gas opened weak; but transactions were almost entirely in Gaslight "A," which fell 8. Imperial had a decline of 2½; Union, 7½; and do. preference, 4. In Water, Grand Junction fell 3; Lambeth and Southwark "D," 2; Southwark ordinary and West Middlesex, 1½; East London, 1. Tuesday's operations were very similar. Gaslight "A" fell 1½; Union, 5; and South Metropolitan, 3. In Water, Lambeth dropped 4; and East London and West Middlesex, 2. Wednesday was a steadier and quieter day. Gaslight preferences were weaker—"C," "D," and "E" losing 2; and "J," 3. In Water, New River fell 2; ditto debenture, 1; and Lambeth, 1. Thursday was remarkable for a rise of 5 in Gaslight "A;" but South Metropolitan moved down 4. In Water, Southwark ordinary lost 6½. Friday's business was all in South Metropolitan, which was steady; and in Gaslight "A," which rose 6. East London Water fell 4. Saturday was quiet. Imperial gained 2; but both Europeans receded ½.

ELECTRIC LIGHTING MEMORANDA.

Parliament and the New Central Electric Generating Stations—Questions of Expediency—Case Against the New High-Voltage Incandescent Lamps.

THE trail of the "promoter" is found over so many modern industrial developments, that it is not surprising that the Chairman of Committees of the House of Lords should have suspected its presence in the new schemes for establishing electricity generating works on a large scale, in the coal fields and elsewhere, for serving distant areas of supply. At any rate, last week this truly powerful personage procured the assent of the House of Lords to the appointment of a Select Committee to join with a Committee of the House of Commons to consider and report upon a series of questions arising out of these schemes. The first question relates really to a suggested amendment of the Electric Lighting Act, 1882, and raises the point of the expediency of giving powers in any cases for the compulsory acquisition of land for generating stations, "and, if so, under what conditions as respects liability for nuisance, notices to surrounding owners, and otherwise." This question is a reminder that electricity generating stations have proved to be greater nuisances than they were expected to be. Although the undertakers of electricity supply are not exempted from liability to actions for nuisance, and have indeed suffered heavily from litigation on this head, still, when they have acquired a site for the generating station which is a necessity of their business, they have a statutory right to make use of it for this purpose. In doing so, they are bound to conform to the highest known standard of working efficiency, with a view to sparing their neighbours and the public generally all preventible annoyance. After this has been done, however, a certain irreducible minimum of nuisance remains. There is smoke, or steam, or dust, or noise, or the carting of coals through quiet streets—and when statutory privilege for these things can be pleaded, if purely on the question of degree, the powers of the Courts are to this extent hampered.

Then arises another question. Supposing it to be desired to establish an electricity generating station outside the area of supply, what should be the rule of Parliament in respect of granting power to compulsorily purchase land for the purpose? Granted that it would be desirable, in the interest of a particular locality, to generate the electricity outside the district, what is the justification for inflicting the nuisance, such as it is, upon another neighbourhood? And, again, what about powers of breaking up the streets for laying mains between such outside stations and the boundary of the area of supply? The foregoing questions relate to electricity supply undertakings of the ordinary kind. But another order of considerations arises in connection with proposals to supply electricity over an area including districts of numerous local authorities, involving plant of exceptional dimensions and high voltage. The first question to be determined in this regard is whether statutory powers should be given to such undertakings at all, especially in view of the complications that might arise in respect of the powers of purchase conferred upon local authorities under the original Act, and with respect to the relations of the promoters to other undertakers and to local authorities within parts of the area. Lastly, it is questioned "upon what conditions (if any) ought powers to be conferred upon promoters seeking to supply electrical energy to other undertakers, and not directly to consumers." It will be observed that this is a really formidable reference. The most serious point of all is that of the bearing of these consolidated schemes of generation, as distinct from supply, upon the rights of local authorities. If any scheme of the kind is allowed to go behind these rights, then all undertakings would follow suit. All the electricity used for lighting the Metropolis might be generated at Deptford; and the different undertakings would find themselves on a fresh basis. At all events, Parliament has taken note of these considerations, and is going to investigate the matter systematically.

The modern high-voltage incandescent electric lamp was recently discussed by the Institution of Electrical Engineers, and did not come well out of the ordeal. A paper on the subject of these lamps, regarded from the makers' point of view, was read by Mr. Byng. The author stated that the raising of the potential in the supply mains from 100 to 200 and 230 volts was effected by central station engineers for their own reasons; reliance being placed upon manufacturers to successfully adjust lamps and minor fittings to the change. These expectations have been fulfilled "in a measure only." The consumer has not been consulted in the matter; and so far the alteration has not been to his immediate advantage. The practical problem before lamp makers has been to supply 200-volt lamps of a given candle power and efficiency, in the same size bulbs as the old 100-volt lamps. With flashed carbon, the makers have met with great practical difficulty in properly disposing the long, slender 200-volt filament within the same space as the shorter, thicker 100-volt filament. Most makers have sought to overcome the difficulty by resorting to a filament of higher specific resistance than that of a flashed filament. Such a filament exists ready to hand in the ordinary filament, such as it is before being flashed. This is what would have been called the unfinished article; but it suits the maker of 200-volt electric lamps "to sell." It shows a very high candle power at first, and the filament is short; but unfortunately it falls very rapidly in efficiency in use. Mr. Robertson's tests show that in the average unflashed 200-volt 16-candle power lamp, the loss of light-giving power in 600 hours is 42 per cent., and the average drop of efficiency is about 35 per cent. These two qualities—candle power and efficiency—are, as Mr. Byng truly observes, the cardinal points of the incandescent electric lamp. Manufacturers have been paying attention to them for the past thirteen years; and now they "have had to be thrown on one side in order to bring about the possibility of using the same sized bulb for a given candle power at 200 as at 100 volts." It is Mr. Robertson's opinion that this advance in voltage is a retrogression, so far as the quality of the lamps is concerned, because it is apparently impossible to obtain a carbon filament of high specific resistance without the accompaniment of the defect of greater volatility. Moreover, a considerable proportion of the high-voltage lamps will not stand at all; about one in twelve being expected to short-circuit the moment they are put in service. All this goes to show that the life of the average 200-volt lamp is shorter than that of the 100-volt lamp, which means greater expense in renewals. Moreover, the 200-volt lamps will only burn properly in the vertical position, and not particularly well at that. When Mr. Byng came to deal with the unsuitability of the usual minor electric lighting fittings to bear the 200-volt service, his tale became quite pathetic. It is no wonder that our contemporary the "Builder," in noticing the paper, described it as "very interesting reading for those consumers who have the misfortune to be supplied with electricity at 200 volts." Mr. Raworth, who does not supply customers at this voltage, declared that the case against it had been greatly underrated by Mr. Byng.

"COMMON EMPLOYMENT" IN THE HOUSE OF COMMONS.

Last Wednesday the House of Commons was invited to reconsider the subject of employers' liability in connection with a Bill introduced by Sir Arthur Forwood, and described as a measure "to abolish defence of common employment in cases of injuries to workmen arising in occupations not within the Workmen's Compensation Act, 1897." Owing to the attitude assumed by the Government, the Bill was read a second time by a very large majority. Thus, on the face of it, the measure is part of the programme of practical legislation now before Parliament; and as such it calls for some notice here. At the same time, we do not expect that anything will come of it. The Home Secretary almost in so many words invited the House to read the Bill a second time as an expression of pious opinion in favour of the principle. He did not wish it to go forth that the Government desired to strangle the Bill; but he declared most emphatically that as a Bill it is both unsatisfactory and incomplete. In Committee these deficiencies and defects of detail are likely to prevent the further progress of the Bill.

Not unreasonably, "The Times" blames the Government for taking up so feeble a position in regard to the Bill, which it classifies as bad all through, as well as inopportune, as it would only effect a random disturbance of the whole body of legislation which Parliament spent a considerable portion of last session in amending. The Workmen's Compensation Act has not yet come into operation; and it seems absurd to reopen the question supposed to have been settled for the time being by this Act before it can be ascertained how the new system works. Such a consideration, however, is not likely to weigh with a private member against a chance of riding his own hobby up and down the House and through the lobby. This particular cause is Sir A. Forwood's hobby; and a very respectable one it is, as parliamentary hobbies go. Employers of labour, and also workpeople, are nevertheless well advised to beware of the philanthropic projects of the amateur legislator when these are directed upon the conditions of employment.

Let us see what Sir A. Forwood's Bill proposes to do. It is entitled "Common Employment Abolition Bill;" and the first clause runs as follows: "In any proceedings which may be commenced after the passing of this Act under the Employers' Liability Act, 1880, against an employer for the recovery of compensation for injury to, or death of, a workman, it shall, notwithstanding any contract to the contrary, be no defence to show that such injury or death was caused by the act or default of another workman in the service of the same employer." A second clause is to exempt from the operation of the Act any employment to which the Workmen's Compensation Act, 1897, applies. The wording of the clauses seems deserving of all the censure poured upon the Bill by "The Times." In the course of the debate upon the second reading, the author of the Bill offered to cut it down to the first clause, so as to leave the House free to deal with the single point of the abolition of the defence of "common employment." But this, as the Attorney-General showed, would not free the House from difficulty.

The best that could be said for the principle was advanced by Sir A. Forwood himself, who stated that it was generally admitted to be a great hardship that a man should receive no compensation from an employer for injuries caused by the negligence of a fellow-workman, in the selection of whom for employment the employer is solely responsible. If the selection is a bad one, and the workman injures a stranger, the employer has to pay. Similarly, if the workman spoils the employer's goods or his machinery, the loss falls upon the employer. Sir A. Forwood's misfortune was that his Bill did not effect the object intended, in thoroughly eradicating this evil; while it went a good deal farther in other directions than is at all desirable—especially in respect of forbidding contracting out.

Perhaps the most useful purpose served by Wednesday's debate was in eliciting the opinions of some of the legal luminaries of the House of Commons on the law of the subject. Mr. Cripps, opposing the Bill, said that the Act of last session brought forward "a principle hitherto unknown in English law, introducing it as an experimental stage, and properly limiting its application to certain trades and occupations." So far as the doctrine of "common employment" was concerned, the Act of 1897 "gave the principle the go-by;" and it will be as well to see how the new departure works before widening it. Mr. Asquith took the opportunity for denouncing the doctrine of common employment in good set terms. He said it was impossible to maintain such a doctrine; and nobody had defended it. His chief objection to the Bill was that it is limited to proceedings taken under the Act of 1880, that Act is restricted in scope, and is on the point of being largely superseded by the Act of 1897. Sir Albert Rollit supported the Bill "as a measure for removing what was on the one hand a long-standing injustice to workmen, and on the other a source of prejudice against employers." He had his fling at the much-abused principle of "common employment," which he stigmatized as an "obsolete survival" from times when the conditions of employment were more domestic in character than they are now. Mr. A. Birrell fairly described the Bill as confusing the issue of the formal abolition of the doctrine of common employment with others. Assuming that nobody had a good word to say for the doctrine, he proceeded to heap abuses upon it. He admitted that it had been abolished for all men who come under the Act of last year; and he thought the opportunity might be taken for removing it from the necks of those working people who do not happen to enjoy the benefit of that measure. "They had got rid of the doctrine in the large and great trades and industries, and they ought also to get rid of it, as they easily could do in a Bill of one clause, for all the rest of the working men in this country. . . . He should like to see the doctrine of common employment got rid of altogether."

Speaking as employers of labour who had been put under the Act of last year, Sir J. Joicey and others supported the principle of the Bill. Their reasons for so doing were reminiscent of the fable of the fox that had lost his tail and wished other foxes to follow his fashion. There is, however, much weight in the argument that all employers of labour will be found in the same case eventually with regard to liability for accidents to workmen and servants. Sir E. Clarke claimed to have advocated the abolition of the principle of common employment in debating the Bill of 1880; and he showed that it was the Attorney-General of the Liberal Administration of that year who upheld the principle. He thought Sir A. Forwood's Bill well meant; and he said he would support it as a Bill of one clause. Mr. A. Provand suggested that the defence of contributory negligence should also be abrogated.

The gist of the Home Secretary's speech has already been given. He could not profess to be delighted that the question should have been raised again so soon; but he was grateful to hear from all parts of the House that the chief fault of the Act of 1897 was that it did not go far enough. The message of the Home Secretary in this regard may be summed up in the phrase—all in good time. Nobody in either House of Parliament sets store by the doctrine of common employment; but at the same time, it is only fair to say that "there is no general consensus of opinion on the part of learned judges or lawyers, or on the part of experienced laymen either, that there is not something to be said for the doctrine." Sir M. W. Ridley was also not without fear that if the Bill were to pass it would hinder rather than facilitate such reasonable extension of the Act of 1897 as Parliament and the public might be prepared for in a year or so. At the same time, if the House wished to record its agreement with the general principle of the Bill, the Government had no objection.

Lastly, the Attorney-General, as in duty bound, expounded the law of the subject. He contradicted the statement of Mr. Birrell that the doctrine of common employment was "judge-made." In giving this assurance to the House of Commons, Mr. Birrell was only repeating the view expressed in his lectures, already reviewed in the "Journal." The Attorney-General now declares that this is "an unfortunate mistake"—which shows how dangerous it is to take even a lecturer on law as infallible . Said the chief Law Officer of the Crown: "The doctrine of common employment was not judge-made, but was part of the common law of England. Prior to 1837, there were many instances of workmen being injured by the negligence of other workmen; and no attempt was made to make the employer responsible. The decision of 1837 was not a new law, but the enunciation of law which had undoubtedly been recognized for many generations before." The Scotch law is the same as that of England. Great judges have held that "there is reason and principle underlying the doctrine that the workman should be supposed to know the risks he incurred when he entered upon his employment; and they were risks from which the master could not protect him, and for which he ought not to be responsible." The Attorney-General agreed that, in some of its developments, the doctrine has been carried to absurd lengths; but he contended that "what Parliament had to consider was what safeguards could be provided to make the doctrine reasonable, unencumbered or disfigured by the excrescences that had grown upon it." But the abolition of the whole doctrine of common employment was not brought before the House by Sir A. Forwood's Bill, limited as this proposed legislation was to the field of operation of the Act of 1880.

It is impossible to exaggerate the importance of the assertion of the Attorney-General that the principle of "common employment" is part of the common law of England. Reduced to its simplest expression, this means that the risks which the groom undergoes in his ordinary employment, if different from those of a cook, must be regarded as all in the day's "work." Even Mr. Birrell seems to agree to the common sense of this way of looking at the matter. Though he appears to teach that the common-law rule was first established by *Priestley v. Fowler* in 1837, he is fain to admit it as "undoubtedly a remarkable fact that, prior to 1836, our reports contain no case of an action brought by a servant against his master for damages for injuries occasioned by the negligence of a fellow-servant." The difference between Mr. Birrell and the Attorney-General lies in the fact that whereas the former seems to minimize the evidence of all before 1836, the latter ascribes the greatest weight to it.

It is easy to see how this line of consideration works out ndustrial ly, though in proposing an illustration we must not be understood to guarantee its applicability to any specific case. A man who engages himself as stoker in gas-works which is a factory within the meaning of the Act, comes under the protection of the Act of 1897; and for him the principle of common employment is "bye-passed." If the same employment is taken

in a gas-works which is not a factory, but only a workshop, then the workman comes within the scope of the principle, so far as the ordinary risks of this employment are concerned.

In Committee, Sir A. Forwood's Bill will be pressed forward as a measure for enacting that "in any proceedings which may be commenced after the passing of this Act against an employer for the recovery of compensation for injury to, or death of a workman, it shall (notwithstanding any contract to the contrary) be no defence to show that such injury or death was caused by the act or default of another workman in the service of the same employer." If Mr. Provand is to be followed, the clause will also bear the *addendum*, "nor was due to contributory negligence on the part of the workman." Such a Bill, it is safe to say, can never be carried this year. The consideration "contributory negligence" is pretty much of a bogey in industrial accidents; but the common sense of the community revolts against the proposal that a man shall be compensated for injuries due to his own fault when he happens to be a workman suing his employer, while in other relations of life misdoing brings its own penalty. It will be impossible to get over this natural objection, until statistics can be adduced to show what proportion mischances due to negligence bear to other risks of industry. When the question arises, it is not the largest and most experienced employers of labour who will set most store by the retention of the defence of contributory negligence. They can appreciate the meaning of the saw, "Familiarity breeds contempt," to a degree of which the amateur of industrial legislation must needs be a stranger. Where is the experienced hoister who never tied a careless knot, the erector whose scaffolding never had a "trap"? With regard to the doctrine of common employment, it will probably be safer to leave the application of this principle to the experience of committees of mutual funds of employers and employed, than to abolish it altogether. It would be safer, as a rule, to entrust this principle to the care of a working-class jury than to a Judge of the High Court.

THE HEAT DEVELOPED IN OXIDE PURIFIERS.

THE attempt made by Mr. Herman Poole to estimate, from thermo-chemical data, the heat generated during the revivification of oxide, was the subject of an article in the "JOURNAL" for the 15th ult. Mr. Poole has inspired another writer, Mr. J. P. Gill, to make an attempt to estimate the heat developed during purification by oxide; and it may not therefore be inopportune to indicate the extent to which reliance may be placed on such thermo-chemical calculations as those given by Messrs. Poole and Gill in the "American Gas Light Journal."

We do not wish to disparage the efforts of these chemists to attack problems of the highest degree of complexity, with an apparatus which is utterly inadequate for their solution, but desire to make it clear that the apparatus at their command is inadequate. Tremendous advances have been made of late years in the very interesting branch of natural science known as thermo-chemistry; but there are many limitations to the general application of the results of thermo-chemical observations. When chemical changes among gases are under consideration, we have a solid basis of experimental data on which reliance may be placed. When we deal with liquids only, or with substances in solution, we have also much fairly reliable work referring to the thermal effects of chemical changes. But when gases react with solids in various states of aggregation, density, crystalline form, &c., to form solids with different physical conditions, we are on uncertain ground if from somewhat analogous cases we deduce a calorific effect purporting to represent the sum of the calorific effects of the physical and chemical changes.

Direct observation of the thermic effect in each case alone is satisfactory; and in many instances this is well nigh impossible. The changes which occur in the fouling and revivification of ferric oxide are rather complex, as we pointed out last month; and hydrated ferric oxide varies considerably in density, degree of hydration, and other physical properties. Hence the study of the thermic effects accompanying purification by ferric oxide is not one to be lightly entered upon by the tiro in thermo-chemistry; and we hope that the articles in our American contemporary may serve to prompt one of the few chemists who have made this branch of natural science peculiarly their own to take up the investigation of the subject. We may instance Professor A. Naumann, whose special knowledge of thermo-chemical work would be supplemented by a more than ordinary acquaintance with the practical details of gas purification. In default of further thermic observations by a competent thermo-chemist, we repeat that the apparatus at disposal is inadequate for the proper treatment of the heat changes which transpire in purification. Such work as can be accomplished from existing data, must needs be inexact, but will not be entirely useless.

We did not follow implicitly Mr. Poole's method of calculating the heat which, under ideal conditions, would be liberated during the revivification of fouled oxide; and though Mr. Gill treats the subject of fouling in a different manner, we do not consider his methods any less open to objection. It is useless to assume that the oxide is wholly converted to either ferrous sulphide or ferric sulphide in the process of fouling. We know that both sulphides are invariably formed; and in default of more information than we have at present, we must assume that one-quarter of the oxide fouled is converted to the ferrous sulphide, and the remaining three-quarters to the ferric sulphide. The grounds for this assumption were stated in the article in the "JOURNAL" above referred to. We will also assume again that oxide, as put into the purifier, has the following average composition expressed in percentages by weight: Monohydrated ferric oxide, 56; moisture, 18; fibre and impurities, 16; and wood chips, 10. After complete fouling, but before revivification, 100 parts of this oxide will have become converted to 132·10 parts of a material consisting of 49·08 parts of ferric sulphide, 13·84 parts of ferrous sulphide, 40·66 parts of moisture, 2·52 parts of free sulphur, 16 parts of fibre and impurities, and 10 parts of wood chips. For the conversion of 100 parts of the oxide to the 132·10 parts of this material, 32·09 parts of sulphuretted hydrogen would be required. We have now to determine how much washed and scrubbed coal gas will furnish this.

Mr. Gill assumes that the unpurified coal gas will contain 0·8 per cent. of its volume of sulphuretted hydrogen. This is a rather low estimate for gas produced from most descriptions of English gas coal; and as we are endeavouring to calculate the maximum calorific effect under reasonably probable conditions, we will assume that the gas contains 1·2 per cent. by volume of sulphuretted hydrogen, which is equivalent to 755 grs. per 100 cubic feet. Now, 100 cubic feet of coal gas weigh approximately 3·7 lbs. = 25,900 grs.; therefore 25,900 grs. of unpurified coal gas contain 755 grs. of sulphuretted hydrogen, or the sulphuretted hydrogen is accompanied by about 33·5 times its weight of coal gas. Therefore the 32·09 parts of sulphuretted hydrogen required to foul completely 100 parts of the oxide, will be accompanied into the purifier by about 1075 parts of coal gas. It may be mentioned that Mr. Gill assumes that 100 cubic feet of coal gas weigh 4 lbs.; but we have preferred to take the figure—3·7 lbs.—given by Newbigging (see Newbigging's "Handbook for Gas Engineers and Managers," fifth edition, p. 362), which is based on the specific gravity of coal gas being on an average about 0·482 (*ibid.*, p. 361).

The combination of 112 parts of iron and 48 parts of oxygen, to form 160 parts of ferric oxide, has a calorific effect of about 179,200 calories. The combination of 2 parts of hydrogen and 32 parts of sulphur, to form 34 parts of sulphuretted hydrogen, has a calorific effect of 4740 calories. The combination of 56 parts of iron and 32 parts of sulphur, to form 88 parts of ferrous sulphide, has a calorific effect of 35,504 calories. The combination of 112 parts of iron and 96 parts of sulphur, to form 208 parts of ferric sulphide, has a calorific effect of 106,512 calories. The combination of 2 parts of hydrogen and 16 parts of oxygen, to form 18 parts of water, has a calorific effect of 68,360 calories. With the exception of the heats of combination for sulphuretted hydrogen and water, these figures are taken from those given last month. Some of the values rest on very dubious authority; and it is doubtful if they refer to oxide and sulphides of iron in the physical state in which they occur in the purifiers. We take them simply as the best available values.

Fifty-six parts of monohydrated ferric oxide contain 50·34 parts of the anhydrous oxide. The heat required to break up this oxide into its elements will be—

$$\frac{50{\cdot}34 \times 179{,}200}{160} = 56{,}381 \text{ calories.}$$

The heat required to break up into its elements 32·09 parts of sulphuretted hydrogen will be—

$$\frac{32{\cdot}09 \times 4740}{34} = 4474 \text{ calories.}$$

The heat necessary to break up the existing combinations is therefore—

$$56{,}381 + 4474 = 60{,}855 \text{ calories.}$$

In the formation of 49·08 parts of ferric sulphide, 13·84 parts of ferrous sulphide, and 16·99 parts of water (*i.e.*, the quantity of water *formed* by the reaction), there would be liberated the following number of calories:—

$$\frac{49{\cdot}08 \times 106{,}512}{208} = 25{,}133$$

$$\frac{13{\cdot}84 \times 35{,}504}{88} = 5{,}584$$

$$\frac{16{\cdot}99 \times 68{,}360}{18} = 64{,}524$$

$$\text{Total. . .} = 95{,}241 \text{ calories.}$$

Therefore the net result of the dissolution of the sulphuretted hydrogen and ferric oxide, and of the formation of the sulphides and water, will be the liberation of—

$$95{,}241 - 60{,}855 = 34{,}386 \text{ calories.}$$

This quantity of heat is available for raising the temperature of the material in the purifier and of the gas passing through it. The weight of water equivalent to the quantities of materials and gas, may be calculated in the usual manner. Thus—

	Parts.		Specific Heat.		Equivalent in Parts of Water.
Ferric sulphide . . .	49·08	×	0·122	=	5·99
Ferrous sulphide . . .	13·84	×	0·122	=	1·69
Sulphur	2·52	×	0·200	=	0·50
Water	40·66	×	1·000	=	40·66
Wood, &c.	26·00	×	0·300	=	7·80
Coal gas.	1075·00	×	0 550	=	591·25
	Equivalent in water			=	647·89

The rise in temperature can therefore amount to—

$$\frac{34386}{647{\cdot}89} = 53^\circ \text{ C.}$$

Assuming that the initial temperature of the materials was about 15·5° C. (60° Fahr.), the final temperature would be 68·5° C., or about 155° Fahr. Some water would be vaporized before this temperature was actually attained; and the heat absorbed in its vaporization would prevent the temperature rising to the conceivable maximum. Many other factors come into play to preclude so high a temperature being realized. For instance, the action is not an instantaneous one, because the quantity of gas required to foul the oxide completely takes an appreciable time to pass through it, and in the meantime heat is lost to surrounding objects and the atmosphere by conduction. A temperature approaching 155° Fahr. cannot be attained by the mere process of fouling with coal gas such oxide as we are considering; and in every instance where it is approached or exceeded, it may be taken for granted that some air is present in the gas, and is causing partial revivification in the purifier. No dangerous temperature can arise by the reactions involved in fouling *per se*. This lesson may be learnt from the above computation, even if in some respects the figures be open to objection. Mr. Gill, in his article on this subject in the "American Gas Light Journal" arrives at the conclusion that the maximum temperature which oxide can attain during fouling is 77° Fahr. It would be courtesy to call his treatment of the subject simply inadequate or inexact.

We purpose again taking up the discussion of the thermo-chemical problems of gas purification at an early date, and perhaps adverting to those of carbonization also.

OBITUARY.

The death occurred last Wednesday of Mr. JAMES CLARKE, who for about twenty-five years had been Manager of the Chesterton Gas-Works. Deceased was in his 65th year.

Mr. JAMES PATERSON, who was for the long period of fifty-seven years a traveller for Messrs. James M'Kelvie and Co., cannel merchants, Edinburgh, died at his residence in that city on the 1st inst. Deceased was the pioneer traveller in the cannel trade, and was a most successful salesman and faithful representative. It is believed that he was acquainted with every gas manager in Scotland, as well as to many outside his native country.

PERSONAL.

Mr. T. WALKER, the Secretary and Manager of the Wrexham Gas Company, has resigned this position after thirty years' service; and the Directors have arranged to retain him as their Consulting Manager.

In the "JOURNAL" for June 20, 1893, we recorded the death, on the previous Saturday, of Mr. HENRY GILL, M.Inst.C.E., the Municipal Water Engineer at Berlin. When the water-works were acquired from the English Company, the authorities took Mr. Gill into their service; and so faithfully did he discharge his duties that they never had occasion to regret their decision. Mr. Gill proved a veritable benefactor to the city in all questions concerning its water supply. We learn that the Municipality intend to publicly testify their appreciation of their late officer by erecting a memorial to him in the shape of a bust, which will be placed very appropriately at the entrance to the water-works on the Muggelsee.

Mr. T. H. DUXBURY, who, as already mentioned, is leaving the Bradford Road Gas-Works, Manchester, to take the appointment of Assistant Gas Engineer to the Bradford Corporation, entertained the officials and leading men to a high tea on Saturday, the 5th inst., at the Belle Vue Gardens. At the same time opportunity was taken of presenting Mr. Duxbury with a walking-stick, suitably inscribed, an umbrella, a "Pelican" fountain pen, and a letter-wallet. Mr. Jennison, the Chairman of the Works Committee, presided. Mr. Rodger, the Manager, made the presentation on behalf of the subscribers; and Mr. Duxbury expressed his thanks for the very useful articles they had given to him.

A large gathering of the staff of the South Metropolitan Gas Company took place at the chief office on Tuesday last, when Mr. CHARLES HOWARD, the late Chief Inspector, was presented with a silver salver and bowl, and also a valuable walking-stick—the latter being a special gift from the service layers. Mr. A. P. Gibbons, in making the presentation, expressed the hope that Mr. Howard might have many years of health in which to enjoy his well-earned retirement—a wish which was most heartily shared by all present. Mr. Howard, in responding, referred to the courtesy and loyal assistance he had at all times received from his colleagues and subordinates. This experience of his official life he said he appreciated as highly as he did the honour paid him by their testimonial of that day.

Institution of Civil Engineers.—The sixth "James Forrest" lecture will be delivered at the Institution next Thursday, at eight o'clock, by Professor W. Boyd Dawkins, F.R.S., who will take for his subject "Geology in Relation to Engineering."

NOTES.

The Dangers of Acetylene.

The regulations which will be enforced on exhibitors at the Acetylene Exhibition in Berlin, from the 6th to the 20th inst. (*ante*, pp. 76, 339), are a striking commentary on the reputed fitness of acetylene for domestic lighting. In the first place, no generator operating with a charge of more than 250 grammes (about ½ lb.) of calcium carbide is to be allowed in the exhibition building; but such generators will be accommodated in adjacent sheds, between which and the building itself there will be a thick iron partition. Any lamps and generators which work with a smaller charge of calcium carbide will be allowed in the building; but after a burner has been lighted, the generation of gas must not be checked until the charge of carbide is completely exhausted! If these conditions be necessary when the generators and lamps are in the charge of men familiar with them, the public can scarcely be expected to adopt such apparatus for domestic use.

Wired Glass.

Mr. Francis Schumann has submitted to the Franklin Institute a report upon the manufacture and use of wired glass. This glazing material was suggested so long ago as 1854; but it has only recently come into extensive use, in the United States, England, and Belgium. It consists of common sheet glass, enclosing in its substance a sheet of wire netting, which is inserted at the rolling stage, while the glass is plastic. The addition of the iron or steel netting does not affect to any appreciable extent the strength of the glass or its transparency; but it is claimed that it does most effectually prevent disintegration or separation of the sheet after fracture, whether by heat or a blow. The chief use of the material is for skylights, windows, and partitions; and for all such positions it has the advantage of being strong and fire-resisting. The wire netting is made of No. 22 B.W.G. wire, with 1 inch hexagonal meshes. It is claimed that, by reason of the effect of the temperature at which the netting is inserted into the glass, the former is always afterwards in tension, so that it tends to close cracks in the glass. Mr. Schumann adduces evidence to show that for warehouse windows, skylights in railway station roofs, and similar applications, wired glass possesses exceptional advantages. In one case, a wired-glass window of a factory gave upon an alley 4 ft. 8 in. wide, on the other side of which was a factory with windows of common glass. This factory was burnt out—the flames also catching and destroying the interior of the former building; but in the wall which remained standing, the wired-glass window survived the fire.

The Collin Coke-Oven.

An illustrated description has appeared in "Engineering" of a coke-oven designed by Mr. F. J. Collin, of Dortmund. These ovens, after an extensive trial in Germany, have lately been erected on a large scale at several English collieries. The Collin oven is preferably of the horizonal type, and it is claimed as a characteristic of the system that the working temperature is high. The time needed for coking is from 20 to 24 hours, so that seven charges a week can be relied upon. The separate ovens themselves are 16 inches wide, and take a charge of about 6½ tons of "smudge" coal. The recovery of the residual products of carbonization is optional, according to the state of the market; but in any case the heat of carbonization is provided by the ignition of the waste coal gas. Most of this is burnt in external flues of the retort settings; but a point is made of the fact that by a special arrangement a quantity of the gas is returned into and burnt in the ovens or retorts themselves. "The gas thus admitted is combined with such portions of air as may be desirable for sustaining the temperature in the most efficient manner for effecting the thorough and rapid carbonization of the coal." The effect of this duplex arrangement is not clear, though it is claimed that its result is the coking of the charge at a very high temperature without destroying the residuals. High temperature was the chief advantage offered by the old self-heating beehive ovens over the modern retort oven, which was heated wholly from without; and if Mr. Collin has now succeeded in combining internal heating of the charge with recovery of bye-products, he must be credited with accomplishing what is almost a contradiction in terms.

Pitch Varnish for Preserving Ironwork.

The subject of the preservation of iron from rust has been discussed in the "Engineer," in continuation of the article on the same subject noticed in the "JOURNAL" for Jan. 4 (p. 20). That article was concerned with paints properly so called. Several other preparations, such as tar and asphaltum, have, however, at one time or another, been recommended as preservative coatings for ironwork; and it is desirable that the case of these coatings should be considered. The writer admits that the use of a linseed oil paint for this purpose has its disadvantages, chiefly centering in the perishable nature of the solid body resulting from oxidation of the oil. Regarded simply as waterproofing compositions, linseed oil—raw or boiled—and varnishes, whether in spirit or in oil, are comparative failures. Turning to coal tar, the writer recognizes that the raw product is not altogether a suitable "paint." He observes that it has been stated that, after heating with 2 or 3 per cent. of lime, ordinary tar can be used without injury to metal, and will form a sound

coating, efficient even in chemical works; but he does not know the mixture personally. He states that if coal-tar pitch, from which the anthracene has been extracted, is carefully softened by the addition of a small proportion of creosote oil, so that it may not become brittle on exposure, and then dissolved in one of the cheaper light oils recovered during the distillation, or in some corresponding product derived from petroleum, a varnish can be prepared which will be found eminently satisfactory in almost every respect. Regarded chemically, moreover, such a mixture is far simpler in constitution than anything that can be obtained from linseed oil and resins; and it is composed of bodies whose properties and reactions are more thoroughly understood, and which are known to be extremely difficult to attack, oxidize, or decompose. Rosin pitch might also be found useful for the same purpose. The writer then concludes: "On the whole, however, the best method of procedure appears to be, first to clean the iron from scale or rust; then ensure its absolute freedom from moisture; next give it a fairly thick priming coat of pure boiled linseed oil alone, carefully laid on and thoroughly worked into all cracks and crevices; and, finally, when this has become perfectly dry and hard—not a moment before—apply a second coat of black varnish in which the chief ingredient is either pitch or asphaltum."

Smokeless Boiler Furnaces.

The enterprise of the Franklin Institute, in collecting from all sources information respecting the actual state of practice in the matter of smokeless boiler firing, has only succeeded in demonstrating the fact that little or no progress has been made of late years towards the complete solution of the problem of burning bituminous coal in steam-boiler furnaces both smokelessly and economically. The inquiry has also gone to emphasize the truth—already well known to mechanical engineers, but not to amateurs of smoke abatement—that to burn bituminous coal smokelessly is apt to be a wasteful proceeding. Hence, sanitary law and not self-interest must be the incitement to smoke prevention in the generality of cases. In a communication to the Franklin Institute, Mr. James Christie, a member of the Committee, points out that the greatest source of loss of efficiency in the furnaces of steam-boilers, is excess of air. Rarely is there any loss from the other extreme of insufficient air supply. Imperfect design, defective construction, lack of care in maintenance, bad stoking—all these defects mean excessive dilution by air; because the chimney draught is always operating towards this result. This is an argument in favour of forced draught. On the other hand, excess of air does not necessarily produce smokeless combustion—quite the contrary, if the air gets in at the wrong place. Mr. Christie has been engaged in testing boilers both hand fired and mechanically stoked, with a view to ascertaining the relative efficiency of different systems. He observes that if we could burn all the combustible in coal, and control the admission of air nearly to theoretical requirements—say, a little over 12 lbs. of air per pound of carbon—the spent gases would analyze 20 per cent. of carbon dioxide, and there would be a trace of free oxygen. If the gases escaped to the chimney at 500° Fahr., the evaporative duty would be upwards of 14 lbs. of water from and at 212° Fahr. per pound of combustibles. In ordinary steam practice, the smoke gases show about 10 per cent. each of carbonic acid and oxygen. In Mr. Christie's tests, smokeless firing by automatic machinery was attended by the admission of 40 lbs. of air per pound of combustible; the boiler having an efficiency of 68 per cent. The same make of boiler, hand fired, gave dense black smoke with 25·78 lbs. of air per pound of combustible; showing 70 per cent. efficiency. Another test showed very light smoke, with 22·48 lbs. of air, and an efficiency of 76 per cent.

Activity in Gas Matters on the Continent.—It does not look as if gas property was at a discount in Germany, or that the German gas apparatus makers are short of orders, for one firm (the Berlin Anhalt Maschinebau Actien Gesellschaft) has on order for delivery this year, besides many other sundries: 11 "Reutter" condensers; 16 "Standard" washers; 38 sets of purifiers; and 22 gasholders—one for Vienna of a capacity of 90,000 cubic metres, and one for Basle of 35,000 cubic metres, about 3¾ and 1¼ million cubic feet respectively.

The Award in the Blaenavon Water-Works Arbitration.—Mr. J. Mansergh, M.Inst.C.E., the Umpire in the Blaenavon (Mon.) Water-Works Arbitration, has made his award. His figure is £10,250; and the Urban District Council are to pay one-fourth of the Company's taxed costs beyond the £250 previously agreed upon. The values placed upon the undertaking by the expert witnesses were: For the Company—Mr. C. Hawksley, £22,567; Mr. Togarmah Rees, £23,073. For the Council—Mr. T. Newbigging, £8456; Mr. G. F. Deacon, £6961.

Train Lighting with Acetylene and Oil Gas.—A mixture of acetylene and oil gas is to be employed for train lighting on the Prussian State Railways. The mixture will be composed of one part of acetylene to three parts of oil gas; and it is claimed that the illuminating power of the oil gas is increased 300 per cent. A flame consuming a cubic foot per hour is said to produce the light of 16 candles. The annual consumption of oil gas on the Prussian railways is now 127 million cubic feet; so that nearly 32 million feet of acetylene will be required for use with it.

COMMUNICATED ARTICLES.

THE DISTRIBUTION OF GAS.

By D. Coats Niven, of Calcutta.

I had the impression that what I had written in the article which appeared in the "Journal" for Oct. 12, 1897 (p. 790) was so clear that the simplest understanding would apprehend it The circumstance of distance has often prevented me from taking a part in the current literature of the gas industry; and as correct thinking is not, in my opinion, one of the traits of the rising generation, the sequence would possibly be misapprehension, with its attendant waste of time. Messrs. Skinner and Canning have since thought it prudent to show their mode of criticism; and the subject being important besides being misunderstood, justifies a reference to my former article.

1.—I affirmed that the American writer stated that the formula required for ascertaining the quantity of gas delivered is as follows:—

$$Q^2 = \frac{D^5 H}{0{\cdot}0000006\, s L}$$

The letters denote the usual factors. On inspection, I find that it is only an old friend in a new dress. By "old friend" I mean the usual formula, thus—

$$Q = 1350\, d^2 \sqrt{\frac{h\, d}{s\, l}}$$

But instead of the constant number 1350, the American writer adopted 1290. The explanation of the long decimal is that it is "equivalent to a vulgar fraction, the reciprocal of which is $(1290)^2$." Accordingly, the equivalent formula is—

$$Q^2 = \frac{(1290)^2\, d^5\, h}{s\, l}$$

which simplified is—

$$Q = 1290 d^2 \sqrt{\frac{d\, h}{s\, l}}$$

Mr. Skinner says (*vide* "Journal" for Dec. 7, 1897, p. 1230), equation No. 2 may be written—

$$Q^2 = \frac{1290^2 d^4 \times d \times h}{s l}$$

and by extracting its square root it becomes—

$$Q = 1290\, d^2 \sqrt{\frac{d\, h}{s\, l}}$$

Now, it is clear that Mr. Skinner repeats my two statements of the formulæ; and it is equally clear he shows no purpose in it but the fact of repetition. One would have thought, from his expressed aggressive spirit towards me, that he would have shown more than a passive judgment. Of course, when he agrees with me I need not differ from him.

2.—Mr. Skinner says that if $\frac{1}{0{\cdot}0000006} = 1290^2 = 1664100$, and also equal to 1666666·6, then the statement is "absurd." Of course, a very small boy will at once say that 6666 and 4100 are not equal; and to say that they are is absurd. Since, then, the absurdity requires no ingenuity to detect it, and is even obvious to a little boy, it has become a *reductio ad absurdum* of Mr. Skinner's own position. His position was that the decimal 0·0000006 was *terminate*. Had he had a little more experience in decimal arithmetic, he would have found that the decimal was *interminate*, and could be extended indefinitely, thus—

$$0{\cdot}0000006009254251 + = 1664100{\cdot}0001 +$$

that, after all, 0·0000006 + was the reciprocal of 1664100; and that therefore there was no absurdity in it. The equivalent vulgar fraction for any circulating decimal is that to which the value of the decimal will become more and more nearly equal until the difference is altogether insensible. In our higher arithmetic there are taught contracted methods of multiplication and division in decimals, which, after all, are based upon the principle of approximation; which being interpreted means "with sufficient accuracy for all practical purposes." The American writer, therefore, by cutting off all the figures on the right of the figure 6 in his decimal 0·0000006, enables him to use that decimal for work both easily and correctly for all practical purposes.

Mr. Skinner, however, says: "Although 1664100 is not the reciprocal of 0·0000006, yet it might be considered sufficiently near for all practical purposes." Now, I have already shown that 0·0000006 is the reciprocal of 1664100; but even if we consider the decimal as a terminate, it is so approximate in nearness for its purpose in the formula for gas distribution that it is equivalent to 1664100. It is strange that Mr. Skinner, posing as a critic, should so quickly forget his charge of absurdity, and now appear in agreement with me by saying that it might be considered sufficiently near for all practical purposes. I would remind him that what is arithmetically absurd cannot be a guide in calculation. But the decimal, with its reciprocal, can be such a guide (as Mr. Skinner asserts); and therefore the decimal with its reciprocal cannot be arithmetically absurd. This is an *argumentum ad hominem* based upon Mr. Skinner's confusion of thought; or it is taking his own stick and knocking him down with it.

3.—Mr. Skinner says: "Omitting the factors h and s (strange omission) Mr. Niven proceeds to determine the discharge capacity of a 4-inch pipe, and says:

$$Q = \frac{1290 \times 4^2 (d^2) \times 2 \sqrt{d}}{30 \sqrt{l}}$$

and that—

$$Q = \frac{1290 \times 16 \times 2}{30}$$

that is—

$$\frac{d^2 \times \sqrt{d}}{\sqrt{l}} = 0$$

which is erroneous." Mr. Skinner's equational conclusion is an absurdity; and therefore his position was false. But his position was not my formula, but his own "mental bye-product;" and therefore this led to absurdity. Alas! correct thinking is not the characteristic of the rising generation; and yet they will decry logic. Now, I expressly put the formula thus—

$$Q = 1290 \times 4^2 (d^2) \times 2 (\sqrt{d}) \div 30 (\sqrt{l})$$

$$1376 = \frac{1290 \times 16 \times 2}{30} = \frac{41280}{30} = 1376$$

In composition, we use brackets for synonyms; and as I wanted the formula and figures in one line, I meant the symbols within the brackets to be explanatory, and not of any force as factors, since they were translated into arithmetic. The comprehension of the formula by anyone would at once grant this postulate. But as there are different degrees of apprehension, and everyone may not understand it, I may put it thus—

$$Q = 1290 \times 4^2 (= d^2) \times 2 (= \sqrt{d}) \div 30 (= \sqrt{l})$$

$$1376 = \frac{1290 \times 16 \times 2}{30}$$

or thus—

$$Q = \frac{1290\, d^2 \times \sqrt{d}}{\sqrt{l}}$$

$$Q = \frac{1290 \times 16 \times 2}{30} = 1376$$

I omitted pressure and specific gravity, for I was concerned with the two factors (d and l)—that is, diameter of pipe and distance. An excellent rule to follow in business life is to exclude from reasoning or experiment the irrelevant; and pressure and specific gravity would have been irrelevant in the formula for the object in view, which was to test the comparative facility of application of the simplified formula and the American writer's decimal formula. Supposing one wants to know the delivery of gas from a 4-inch main at 900 yards, omitting pressure and specific gravity, refer to the foregoing for the calculation.

4.—Mr. Skinner says that "while $d^2 \times \sqrt{d}$ or $\sqrt{d^5}$ is the correct form, it would be well if even the simpler, though less accurate, d^2 were more used." He also states that $\sqrt{d^5} = \sqrt{d} \times d^2$. This is another case as to which I can only again say that when he agrees with me I need not differ from him.

5.—Mr. Skinner has made an attempt at syllogizing; but he confuses an apparent syllogism with the real, and, in fact, evidently does not know the conditions of a syllogism. Take the following attempt: "Most gas men at home, where many are ready to help, do not need much logical skill; but most gas men abroad, where few are ready to help, need much deductive skill. Therefore gas men abroad are greater logicians than their colleagues at home. This is clearly what Mr. Niven implies in his latest effusion." Mr. Skinner would call this a syllogism; but it is simply a parody of one, and the ideas contained in it I neither expressed nor implied—they are too absurd. This is another of Mr. Skinner's "mental bye-products." If, in advocacy of logic, I say that it enables a man to make the best use of his capacity, and if boards of directors wish and demand that their managers should be able to do this, is it not plain that such boards will say: "We want a man to administer our property abroad who, besides possessing the necessary qualifications, must, to a certain extent, be a logician;" and I emphatically state, from personal experience, that he will have less trouble and annoyance in his daily routine of procedure.

Mr. Skinner does not see the connection between a logician and a boxer. He says that I have committed the "error of attempting to connect things unlike," which he thinks "is called, in logical parlance, *fallacia compositionis*." I am sure that since he has passed through my hands he will not be surprised to be told that it is no such thing. "The fallacy of composition is shown when the major premises is employed in a distributive sense, and the minor in a collective one." Now, the resemblance is very striking between the logician and the boxer. They are both fighters, the one against error, and the other against blows. They are both fencers, the one intellectual, who by means of forms of mood and figure and principles of method exposes the weakness and fallacy of arguments or intellectual blows, drives the enemy—error—from the field, gains truth and protects it; the other physical, who by means of guards and lunges weakens or parries the physical blows, repels the enemy, and protects the person from harm. They are both arts; and they give courage. In the one, all the intellectual powers are subordinated to the encounter; in the other, all the bodily powers are united as one unit of force to make the encounter a victory.

Mr. Skinner asks questions about mains and meters which show that he is young at his trade. He thinks that scholastic logic should answer them; and thereby he commits an *ignoratio elenchi*. Why, we have men who do not get a shilling a day (or rather the equal of it) who would be doing the work while he was wondering over the question.

This closes the criticism of Mr. Skinner. I find that in what he could apprehend he agreed with me, and in what he could not apprehend he differed from me. The difference between him and me is broad, and the *differentia* is correct thinking, which can only be the result of disciplined reflection. I should advise Mr. Skinner to take a back seat for five years, and when he again attacks me he will only do so by mood and figure, and I shall reply in the same manner; otherwise it will waste time.

My other critic is Mr. Canning. He accuses me ("JOURNAL," Oct. 19, 1897, p. 851) of misrepresentation, as I thought his remarks were equivalent to saying that a number of gas managers were ignorant of their business. He evidently does not mean that; and yet he has not precisely stated what he does mean. I did not intend to wound his feelings. I do not know him personally or otherwise. He has the idea that a statement and all its reasons should be quoted, if quoted at all. Otherwise it is misquotation, or mutilating a paragraph. But surely Mr. Canning knows that if I quote a statement with approval, and not for criticism of its validity, I do not require to consider or quote its reasons. In any case like that, the term should be called "non-quotation." Mis-quotation has another meaning, and implies deceit, carelessness, or stupidity.

There is really not much difference between my critic and myself. When he stated that the "relative discharging capacity of pipes was the square root of the fifth power of the diameter $= \sqrt{d^5}$," I agreed with him. But the reason I did not quote his statement "that the volume of fluid delivered by a pipe is equal to the product of the sectional area of the pipe multiplied by the mean velocity of flow," was that I agreed with him, and also because many years before Dr. Pole had said that "the mean velocity is such a velocity as being multiplied into the area will give the quantity passing through."

Mr. Canning claims, he says, that the rule ($\sqrt{d^5}$ symbolized) "has the merit of accuracy and simplicity." He goes on to say: "Mr. Niven is good enough not to deny the accuracy, but he impugns the simplicity. He thinks he would want a clerk to aid him in making the calculations. There I agree with him. I only judge by the sample of his method of calculation which he has given, which entirely ignores the use of such elementary aid as that of logarithms."

My reason for accusing Mr. Canning of ignorance of Dr. Pole's essay was that I could not see how, if he had thoroughly mastered it, he could make any claim about the rule symbolized by $\sqrt{d^5}$. Hurst also states in his "Handbook," "that the relative capacity of pipes for supplying gas varies as $\sqrt{d^5}$." Of course, it is well known that

$$\begin{aligned} \sqrt{d^5} &= \sqrt{(d \times d \times d \times d \times d)} \\ &= \sqrt{(d^4 \times d)} \\ &= \sqrt{d^4} \times \sqrt{d} = d^2 \times \sqrt{d} \end{aligned}$$

$$\therefore \sqrt{d^5} = d^2 \times \sqrt{d}.$$

Mr. Canning admits that in arithmetic the calculations are more easily made by means of the formula ($d^2 + \sqrt{d}$) than by its equivalent formula $\sqrt{d^5}$. Now, this is the point for which I contended; and when it is admitted, I can only say that when Mr. Canning agrees with me I need not differ from him.

I freely admit that logarithmic arithmetic is superior to the common arithmetic, and that, as Jackson says, "the amount of knowledge required to enable anyone to work with logarithms is exceedingly small—a mere portion of elementary education that may be acquired in a day or two by a grown-up person." At the same time, I hold that we cannot always be carrying logarithmic tables, or slide-rules, or calculating-machines, with us; and I think, despite the temptation to do otherwise, lads at school should be well grounded in arithmetic, not only in the rules, but in the short and easy methods of applying them, including the square, cube, and fifth roots, before proceeding to logarithms.

To illustrate what can be done by logarithms, but not by common arithmetic, I will take the following:—

Find the 365th root of 1·025.

1·025. log. $\bar{2}$·0107239 $\times \frac{1}{365}$

Ans. 1·000068; log. $\bar{4}$·0000294.

Now take a case where common arithmetic beats logarithms

Find the square root of the fifth power of 16.

16. log. 1·2041200 $\times \frac{5}{2}$

$$2\overline{)6\cdot0206000}$$

Ans. 1024; log. 3·0103000

$$\sqrt{d^5} = d^2 \times \sqrt{d}.$$

$$\sqrt{16^5} = 16^2 \times \sqrt{16} = 256 \times 4 = 1024.$$

I do not proceed further in this line, as I feel that it would be playing the schoolboy and trespassing on your space.

I observe that Hurst, in his "Handbook," puts the formula thus—

$$Q = 11 \sqrt{\left(\frac{a^5 p}{g l}\right)}$$

But $Q = m\, d^2 \sqrt{\frac{d p}{g l}}$

When

p = the pressure in inches.
g = the specific gravity of gas.
m = the constant quantity—say 1350.

Now I must close. I find that my two critics bid me farewell in a spirit that will not be grateful to me for anything in future. I may retort that, seeing that there is nothing akin between them and me, whatever I do write is not meant for them—either for their benefit or for their favour.

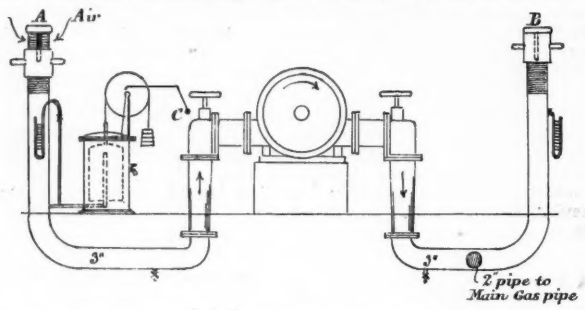
REGULATING THE ADDITION OF AIR TO GAS.

By Herr IRMINGER, of Copenhagen.

The addition of air to gas is now such a common practice, that it may perhaps be of interest to readers of the "JOURNAL" to know in what manner it may be safely and easily effected by means of a small rotary exhauster.

I obtained from Messrs. Bryan Donkin and Co. an exhauster of the capacity of 5000 cubic feet per hour, provided with a "hydraulic regulator" actuating the steam-valve; and the question arose how it might be possible to regulate the air in such a manner that the same quantity—determined in proportion to the bulk of gas produced and its lighting power—would always be admitted, without change as the result of the back-pressure being greater or less, the steam-pressure varying, or some other similar circumstances. In order to obtain this result, I proceeded as explained below; but the plan may be altered according to special conditions.

Our works are in two complete sections, kept quite separate. The air is pumped and measured for each section by means of an exhauster common to both. It is placed in the engine-house, near the gas-exhausters, and the air is led in in front of the latter on the suction side, where the suction is about $\frac{3}{4}$ inch. It may, however, be admitted equally well on the pressure side.



The inlet-pipe to the exhauster is connected with a 3-inch pipe which projects about 4 feet above the floor, as shown in the diagram. It is closed at the end, near which its circumference is provided with four openings A, each $\frac{1}{2}$ inch by $3\frac{1}{2}$ inch. These openings may be closed more or less by the turning of a socket. The regulator bell is connected with this pipe by means of a $\frac{1}{2}$-inch pipe provided with a pressure gauge for indicating the extent of the suction. The bell is placed in communication with the steam throttle valve C, and is so balanced as to give a suction of $1\frac{1}{2}$ inches.

The quantity of air entering will depend entirely on the opening A, which may be varied according to circumstances—the amount of air remaining the same as long as the opening is unaltered. If, for instance, the engine is running slower on account of increased back-pressure, the bulk of air will not be so large, the loss of pressure in the opening will be smaller, and the suction in the pipe less strong; whereupon the bell will be lifted, and will open for the steam. The same operation will take place when the steam-pressure is lowered. When the back-pressure is reduced, or when the steam-pressure increases, the engine will run more quickly, the suction in the pipe will increase, and the bell will shut off the steam. I have tested this under all conditions with a back-pressure up to 20 inches of water, and found the quantity of air always the same.

When the back-pressure is 20 inches, the engine will make 20 more revolutions per minute than when it is 3 inches. But this fact is due to the circumstance that some of the air is bye-passed round the blades of the exhauster, while the quantity of air pumped into the gas remains the same. The only effect of the leakage, therefore, is that the engine runs faster. This may be proved by letting the air pass through the two meters (one for each section), taking the density and temperature of the atmosphere into consideration. The quantity of air passed must necessarily be the same, because when the suction is constant (which is always the case, as the weight of the bell is the same) and the opening is unaltered, the amount of air must also be constant.

If it is desired to admit more air, A is opened; if less, it is closed. Even with sudden changes, the engine after a few seconds will again run at its normal speed; and it can make from 60 to 260 revolutions per minute. If it should be desired to admit less air than the quantity corresponding to 60 revolutions (1080 cubic feet per hour), B is opened a little more—being arranged in the same manner as A; and the rest passes through the meters. During the winter, with ordinary Newcastle coal, from 2 to 5 per cent. of air has been used (the illuminating power of the gas being $15\frac{1}{2}$ to 16 English candles) up to 112,000 cubic feet in 24 hours—the engine could not pump more. As the meters were not large enough for this quantity, a bye-pass on them was opened, and the quantity of air was arrived at by counting the revolutions per minute. One revolution proved to be equivalent to 0·3 cubic foot. It is therefore easy to make a table showing the number of cubic feet in 24 hours corresponding to a certain number of revolutions per minute.

For ordinary use, and where great accuracy is not required, a meter is unnecessary; yet it is preferable to have one, and read off the results every day. Regulation may be easily effected by opening A to such an extent that the engine makes a number of revolutions corresponding to the quantity of air required. As already remarked, the air may be admitted on the pressure side, if desired, in which case a little more power will be required. But as the consumption of steam is insignificant, this is of no great importance. In places where there are two meters, as is the case in these works, each is provided with a valve and a pressure gauge on the tube, in order that the air may be distributed to either system. The outlet-pipe of the meters is further provided with a small self-closing valve, like an ordinary bye-pass valve, to prevent the gas, if by chance it should be under pressure, streaming out when the engine is not working and B is opened.

In cases where, as in the one mentioned above, it is required to pump a certain determined quantity of air, irrespective of back-pressure, steam-pressure, leakages in the exhauster, &c., the arrangement above described may be recommended as a safe and accurate one.

TECHNICAL RECORD.

THE VALUATION OF SPENT OXIDE.

Dr. Lubberger, of Carlsruhe, in an article in the "Journal für Gasbeleuchtung," points out that spent oxide is often valued solely on the basis of the amount of prussian blue which it contains. This statement applies to spent oxide from nearly all Continental gas-works, and from the numerous works in this country where purification by lime has not been adopted, or where the oxide is used in an anterior position to the lime. We therefore give some particulars from Dr. Lubberger's article.

The simplest and most general method of estimating the prussian blue in spent oxide is that devised by Drehschmidt. It is described by him in the fourth edition (German) of Muspratt's "Chemie," Vol. V., p. 505. Ten grammes of the oxide are put in a 500 c.c. flask, along with 150 c.c. of water and 1 gramme of ammonium sulphate. Fifteen grammes of mercuric oxide are then added, and the whole is boiled for a quarter of an hour. After cooling, it is agitated while 0·5 to 1·0 c.c. of a saturated solution of mercurous nitrate, and so much ammonia as causes any precipitate, are added. Then the flask is filled to the mark with water, and a further 8 c.c. are added to compensate for the volume of the solids. It is afterwards agitated, and filtered through a dry filter. Then 200 c.c. of the filtrate, representing 4 grammes of the oxide, is transferred to a 400 c.c. flask; and at least 6 c.c. of ammonia (·91 sp. gr.) and 7 grammes of zinc dust are added, for the purpose of separating the mercury from the mercury cyanide, and converting the cyanogen into ammonium cyanide. After agitation for some minutes, 2 c.c. of 30 per cent. solution of potash are added, to prevent volatilization of hydrocyanic acid; and the whole is made up to 400 c.c., and filtered through a dry filter. Then 100 c.c. of the filtrate, representing 1 gramme of the oxide, is mixed in a 400 c.c. flask with excess—30 to 35 c.c. generally suffice—of decinormal solution of silver; then agitated; and acidified by means of dilute nitric acid. The cyanogen is thus separated as silver cyanide; and after the precipitate has settled out, the flask is filled up to the mark, agitated, and the contents filtered through a dry filter. Then 200 c.c. of filtrate is taken for the determination of the excess of silver used, by titration with $\frac{1}{10}$ normal solution of ammonium sulphocyanide, according to Volhard's process.

It has often been questioned whether the sulphocyanide and chloride are wholly removed by the mercurous nitrate and ammonia precipitation. Burschell has therefore adopted the plan of extracting the blue from the oxide in the first instance, by means of alkali and iron salts; and only estimating by Drehschmidt's method the blue thus purified. But Drehschmidt has shown that the sulphocyanide and chloride are wholly removed if a sufficient quantity of the mercurous nitrate is added, and that then only the cyanogen is estimated in the titration. In the great divergence in the composition of spent oxides, it has, however, been observed that a portion of the cyanogen can exist in them in combinations which do not permit of the production of ferrocyanide by the usual manufacturing processes This portion of the cyanogen is therefore valueless for the manufacture of blue or other ferrocyanides. Drehschmidt has, indeed, shown that the whole of the cyanogen in the spent oxide from the Berlin gas-works can be converted to potassium ferrocyanide; but it has not been proved whether or not such is the case generally.

A number of samples from the Carlsruhe Gas-Works were therefore examined according to Drehschmidt's method, and to Burschell's modification of that method. As much sulpho-

cyanide was present in some cases, the effect of using 10 c.c. in place of 1 c.c. of solution of mercurous nitrate was tried; as was also that of extracting most of the sulphocyanide from the samples with hot water, and otherwise proceeding according to Drehschmidt's method. The following results are selected from those given in the paper:—

No. of Oxide Sample.	Percentages of Prussian Blue according to—				Percentage of Sulphocyanide, as the Ammonium Salt.
	Drehschmidt's Method.	Burschell's Modification.	Drehschmidt's, Varied by the Use of 10 c.c. of Mercurous Nitrate.	Drehschmidt's, after Preliminary Extraction of Sulphocyanides with Hot Water.	
III.	11·12	7·90	10·11	..	2·00
V.	8 60	6·96	..	7·82	1·75
VI.	9·50	7 39	..	8·90	1·75
VII.	9·11	7·16	..	8 80	1·98

It seemed very improbable that so much of impurities could be present in the silver precipitate as the differences in these numbers indicated; and as qualitative tests of the precipitate confirmed this view, quantitative tests were carried out. Drehschmidt's method was pursued until after the point where zinc dust is added; then measured quantities of the solution which has been treated with zinc dust were mixed with excess of silver nitrate, and acidified with dilute nitric acid. The precipitate was next dried at 105° C., and collected on a weighed filter; and the weight when constant was noted. This is the weight of silver cyanide *plus* impurities. After incineration of the filter apart from the precipitate, the latter was raised to incandescence, first in air, and afterwards in a stream of hydrogen, until the weight was constant. The weight of silver thus found afforded by calculation the weight of silver cyanide equivalent to it; and from the difference between this weight and that of the silver cyanide *plus* impurities, the amount of silver sulphocyanide in the impurities was found from the ratio between the molecular weights of silver cyanide and silver sulphocyanide. The qualitative tests had established the absence of chloride in the precipitate.

In one volumetric determination by Drehschmidt's method, 19·7 c.c. of decinormal solution of silver were used per gramme of oxide. Now 1 c.c. of this solution corresponds to 0·4771 per cent. of blue; therefore the oxide would contain according to this test 19·7 × 0·4771 = 9·39 per cent. of blue. Presuming 18 c.c. of the solution were precipitated by ammonium cyanide, and the remaining 1·7 c.c. by ammonium sulphocyanide, then, because 1 c.c. of decinormal silver solution is equivalent to either 13·4 milligrammes of silver cyanide or 16·6 millgrammes of silver sulphocyanide, the precipitate from 1 gramme of the oxide would consist of 0·2412 gramme of silver cyanide and 0·0282 gramme of silver sulphocyanide, and would weigh 0·2412 + 0·0282 = 0·2694 grammes. If the whole of this precipitate were regarded as silver cyanide, 20·1 c.c. of decinormal solution of silver would have been needed; and this would have been equivalent to 9·59 per cent. of blue in the oxide, which is a higher result than that afforded by the volumetric Drehschmidt test. A higher result than that obtained by the volumetric test is obtained whenever appreciable quantities of sulphocyanide are present. In tests on four samples of oxide, the results were in every case lower than those obtained volumetrically, therefore the precipitates could have contained only trifling amounts of sulphocyanide. The following are the figures obtained by these and other methods from the four samples:—

Sample Number	Percentage of Prussian Blue in the Oxide.			
	III.	IV.	V.	VII.
By Drehschmidt s volumetric method. .	10·50	9·39	8·60	8·80
Calculation from the total weight of the precipitate, which is regarded as wholly silver cyanide	10·30	9·34	8·58	8·74
Calculation from the weight of silver cyanide as calculated from the silver obtained	10·30	9·04	8·08	8·51
By Burschell's modification	7·90	6·58	6·91	7·13

These figures demonstrate that the solutions which have been treated with the zinc dust contain in all cases more hydrogen cyanide than could be formed from the prussian blue present. They show that there exist in spent oxide, in addition to the ferrocyanides, other cyanogen compounds which do not yield prussian blue and are not precipitated by iron salts. These compounds, however, yield mercury cyanide when boiled with mercuric oxide; and they are consequently estimated as prussian blue in Drehschmidt's method. But the spent oxide is only worked up to ferrocyanides; and therefore the other cyanogen compounds are of no value to the chemical works. Drehschmidt's method, without preliminary extraction of the blue according to Burschell's plan, can therefore only be used for the valuation of spent oxide when it is certain that all cyanogen compounds, except ferrocyanides, are absent. In conjunction with Burschell's modification, it undoubtedly is the most reliable and exact method of valuation yet devised.

THE ESTIMATION OF ETHYLENE AND VAPOUR OF BENZENE IN GASEOUS MIXTURES.

Practicable methods for the quantitative separation of ethylene and benzene in gaseous mixtures, such as coal gas and coke-oven gases, are very much needed. Herren E. Harbeck and G. Lunge have lately elaborated methods for separating these hydrocarbons, and have communicated them to the "Zeitschrift für Anorganische Chemie."

The first method depends on the addition of hydrogen to ethylene, which takes place under the influence of platinum black, as De Wilde had observed previously. The gaseous mixture must contain an excess of hydrogen. One sample of the mixture is analyzed according to the ordinary methods; and the sum of the quantities of ethylene and benzene is ascertained in the course of this analysis by means of fuming sulphuric acid. Another sample is passed several times to and fro over platinum black in a capillary tube at 212° Fahr., and the ethylene and the oxygen are thus abstracted from the gas, while the benzene is unaffected. The residual gas is then treated with fuming sulphuric acid; and the amount of absorption which occurs gives the quantity of benzene in the gas. On deducting this quantity from the sum of the ethylene and benzene ascertained in the first sample, the amount of ethylene in the gas is known. The remaining constituents of the gas (with the exception of the hydrogen and methane) may be again determined in the residue of the second sample; and a check on the analysis of the first sample is thus secured. This method of separating ethylene and benzene is unfortunately not applicable to the majority of cases in which such a separation is required; as whenever carbonic oxide is present in the gas, the activity of the platinum black is interfered with. It is not, therefore, of use in the analysis of ordinary coal gas.

A second method of separation depends on the fact that benzene vapour and ethylene are wholly absorbed from gases by an excess of a mixture of equal parts of concentrated sulphuric acid and of fuming nitric acid (sp. gr. 1·52). The benzene is converted by the acid to dinitrobenzene, which is barely soluble in cold water, but is readily soluble in alcohol and ether. The products of the action of the acids on ethylene are, however, readily soluble in water, and are not extracted by ether from their aqueous solution. The ethylene does not, therefore, affect the purity of the dinitrobenzene. Experiments showed that this method was applicable in all cases for the determination of benzene in mixtures of hydrogen and hydrocarbons of the fatty acid series—such as ethylene.

A PLAUSIBLE PROJECT FOR THE ECONOMICAL PRODUCTION OF CALCIUM CARBIDE.

We drew attention in the "JOURNAL" for May 4 last (p. 987) to a suggestion made by Dr. A. Frank, of Charlottenburg, that calcium carbide might advantageously be produced in the fen districts of East Friesland and Oldenburg from the local peat deposits and limestone from the banks of the Ems. Since that time, Dr. Frank's scheme has attracted much attention in the German technical press; and in October, he elaborated it in a paper which he read before the Association for the Advancement of Industry, in Berlin. We have received from him a copy of his very interesting communication.

The area of the peat bogs of Ireland is stated to be about 4250 square miles. Holland has still about 770 square miles; while between the Ems and the Elbe in Hanover and Oldenburg, there are 3090 square miles, in addition to about 540 square miles to the west of the Ems, and large areas in other provinces of Germany. The Dutch, by the construction of canals for the transport of peat to the towns, have already greatly diminished the area of the peat swamps in Holland; and by judicious manuring of the subsoil, they have thus added many acres to the productive land in the country. But the bogs on the German side of the frontier line have not been dealt with in the same manner, though in places a process of burning off the upper stratum of peat is carried on; and the ash of the peat renders the underlying soil fertile for a few seasons. The value of the peat as fuel is entirely lost; and the absence of canals or other means of transport makes it impossible to obtain manures for the soil, which soon becomes absolutely barren. It is on these peat bogs that Dr. Frank hopes to see established a flourishing calcium carbide industry.

The peat has only about one-third the heating value of coal; and hence it cannot be profitably transported to a distance for use as fuel. But if used on the spot, 10,000-horse power per day could be obtained by the consumption in boiler furnaces of 600 tons of peat. It is computed that, on the average, about 0·31 square mile of the German bogs would yield this amount of peat for one year. In practical working, 1 ton of carbide is produced from 1·3 tons of lime and 1 1 tons of carbon, at an expenditure of 6000 horse-power-hours. A plant of 10,000-horse power per day would therefore produce about 40 tons of carbide from 52 tons of lime and 44 tons of carbon. This quantity of carbide, if produced throughout a year of 300 working days, would yield acetylene equal in lighting power to 18,000 tons

of petroleum. In 1896, Germany imported about 840,000 tons of petroleum; and it is in place of some portion at least of this imported petroleum that Dr. Frank hopes that carbide made from the native peat may be used. He does not contend that acetylene can displace coal gas in towns; but he considers a cheap supply of carbide would make it an active competitor with petroleum in country districts.

THE CONSTRUCTION OF INCLINED GAS-RETORTS, CHARGING APPARATUS, AND CONVEYING MACHINERY.

By Maurice Graham, Assoc.M.Inst.C.E., M.Inst.M.E.

A Paper read before the Birmingham Association of Mechanical Engineers, March 8, 1898.

The subject of the paper which I bring before you this evening, may at the outset appear a little foreign to the objects of this Association; but when I point out the fact that there are 12¼ million tons of coal used in the gas industry per annum, for the production of gas for artificial illumination, and furthermore when I say that more than 25 per cent. of this enormous weight is dealt with mechanically, you will, I think, agree that it is a fit subject to be brought before the notice of this Mechanical Institution.

For some years past, the author has been specially engaged in the introduction of mechanical appliances for the transmission of coal and its carbonization in gas-works; and it is the means which my experience has proved to me to be most efficacious, which forms the subject of my paper. The main object in view is the automatic handling of the material from the receipt of the coal by truck, boat, or cart to the discharge of the coke in the yard.

The year 1889 saw the introduction into England of the method of carbonizing by means of inclined retorts, and utilizing the force of gravity for charging the same. Prior to this date, the principle was introduced in France on a very small scale at the gas-works at Rheims, by M. André Coze, who patented the inclined retort and angle of repose. The credit of its introduction here is due to Mr. Frank Morris, Engineer to the Brentford Gas Company, London, who erected the first plant at the Southall Gas-Works, and introduced the straight through inclined retort (see Diagram I.) instead of the clay retort and vertical cast-iron mouthpiece connected together and set in the brickwork, which had proved such a failure. My connection with the system dating from this period, I have had the opportunity of watching the development of the principle, more especially as regards its construction; having been responsibly connected with over 80 per cent. of the work erected. It is my intention in this paper to give you as practical and as graphic a description as I possibly can, and at the same time to bring before you many improvements introduced which have added to the general success of working. You, as engineers, will agree with me that, in any structure similar to the one before you, the success of the process depends principally upon the working of the minor details; and it is to these details I wish to draw your attention. I will endeavour to describe to you the working of the plant as briefly as possible, and afterwards take the structure more in detail.

Diagram I. shows a section of a retort-house suitable for an installation of a single bench of inclined retorts. The coal is shown brought in by railway waggon, and shot down into a bunker A. This can be made of any suitable size, provided the sides are of sufficient slope to ensure the coal sliding towards the door B; otherwise considerable difficulty is caused getting very fine coal—and more especially when damp—to run freely through the doorway. The coal from here falls upon a screen C, with moveable bars, which not only has for its object the screening process, but induces a more regular feed to the coal-crusher D. The fine coal dropping through the screen, falls below into a connecting shoot E, which directs it to the automatic feed F placed before, and above, the boot H. The larger coal, which passes through the crusher, joins the small coal in the receiving chamber. The object of this feeder is to regulate the supply of coal to the boot, and thus obtain an even charging of the elevator buckets. The coal is then elevated by the elevator K, and deposited upon the conveyor L (see also Diagram II.), which in turn distributes it throughout the series of tanks M. From here the measuring chambers N are fed; each containing a charge of coal. These measuring chambers are designed upon the shot-pouch principle, and will be described later on in detail. Underneath these chambers a small tubular shoot O runs (Diagrams III. and IV.), which may or may not contain the charge in suspension. However, the object of this shoot is to conduct the coal from the overhead chamber into the retorts, and at the same time to regulate the velocity of the falling coal according to the nature of the material.

To the design of the charging apparatus, I have given special care and attention; and the numerous experiments I have carried out have afforded me the opportunity of collecting data which is the basis upon which a successful and reliable charger can be designed, and which combines the necessary details to ensure an even delivery of coal upon the floor of the retort. The lower portion of this shoot is first inserted into the mouthpiece of the retort (see Diagram No. I.). Everything is now in readiness for charging. The stoker, by pulling the lever P in the direction of the dotted line, opens the slide at the bottom of the measuring chamber N; and the coal falls down the shoot. When arriving at the bottom, it strikes against one or more baffle-plates, and is deviated from the vertical line, and, checked in its speed, commences to travel along the floor of the retort.

At the lower end of the retort, is shown an iron stop-plate, supported by means of a light frame. The coal impinges against this plate, and then commences to gradually form an even layer towards the charging mouthpiece. It is very interesting to watch this operation from the lower or drawing mouthpiece. When a different quality of coal is about to be used, this requires some slight alteration of the checks on the charging shoot, &c.; and to obtain an easy adjustment, the drawing mouthpiece is left open during the time the coal is being spread upon the floor. This distribution is carefully noticed by the stoker in charge; and by these observations, the charge of coal can be spread over a retort in an even layer from about 3 inches to 8 inches deep. If a looking-glass be placed upon the lower, or drawing, stage at a right angle to the angle of the retort, the whole layer of coal or hot coke can be readily seen throughout the retort. This is often done for visiting engineers to inspect the charges.

When the whole of the coal has run into the retort, both self-sealing lids at each end are fastened up. The gas from the coal travels to the front of the retort, and goes up the ascension-pipe, and from there to the hydraulic and foul mains respectively. When the coal is burnt off, the shield is run in front; the lid opened; the stop withdrawn; and the whole of the charge will slide out of the retort, and be directed, by the shield Q underneath the stage, as illustrated in the diagram. The coke is shown as having fallen down the shoot; and a stream of water is playing upon it for slaking the same. From here it is run into the yard or deposited into the coke-elevator R, and raised by this means to a height of about 30 feet, and fed on to a conveyor or direct into a tank or bunker S, from whence the coke trucks or carts can be filled. This brief description is an outline sketch of the process of the distillation of coal by the introduction of the inclined-retort system.

I will now commence my observations upon the details of structure in connection with an installation on this principle. Owing to the great expense and large amount of capital sunk in the retort-house, one can readily see that in the early days engineers were somewhat reticent about adopting this new principle, and preferred to wait until their existing retort plant was worn out or inadequate for the demand. With these reasonable excuses, it was necessary that we should adapt it to the existing buildings; and this was done with some slight alterations, such as raising the walls and roof. The question of foundations was one of great importance; but I found that a depth of about 5 feet where there was good ground made a substantial bed. Where the old foundations existed, the top was levelled up to the floor-line, and the holes for the feet of the buckstays prepared. These should be not less than 1 ft. 6 in. at the front and back, and 2 feet at the ends. Underneath the buckstays it is preferable to bed in some old fire-bars T, to form a correct level for the stays, and thus not only facilitate speed in erection, but also guarantee and maintain a true level in the hydraulic main, as the latter is supported from these. The dead weight of the coal-bunkers is upon these back buckstays, and therefore good broad feet must be provided, as shown on Diagram I.

With regard to existing buildings, the questions asked are: "Is my house wide enough?" and "What height do you require?" It is a singular thing that most of the houses, though at present averaging a height of 23 feet, are strong enough to have their walls raised to a height of 50 feet, which is the height for a house containing a single bench of retorts 20 feet long, and arranged as shown on Diagram I. By the introduction of a buttress here and there, and the necessary openings for the elevators cut in the wall, it is found that the existing building can be used. I suggest the following dimensions for houses, single or double, and for retorts varying from 15 feet to 20 feet.

New single houses for 15-feet retorts would be much more serviceable if built not less than 48 feet span; and for 20-feet retorts, not less than 52 feet span. These dimensions allow of 16 feet for the charging stage, and 19 feet for the drawing stage; the width of the bench on the horizontal line making up the remainder. In double houses, where the charging stage is between the two benches (see Diagram I., fig. 3)—and this in my opinion offers better facilities for handling the material and the adaptation of the superstructure, &c.—the width of this stage should not be less than 24 feet. This ensures a well-ventilated charging stage. It is, however, preferable, if the space can be afforded, to even extend this dimension to 26 feet. The ventilation of the centre stage is obtained by adopting perforated cast-iron floor-plates, which allow a current of air to rise up, and thus keep the stage suitable for working. The drawing stage, when the building is completely closed in, should be at least 20 feet. The inclusion of the horizontal width of the stack for the 15-feet and 20-feet retorts respectively, according to the angle the settings are built to, will complete these dimensions. They are as follows: Double houses, suitable for 15-feet retorts, are 90 feet span; and for 20-feet retorts, 100 feet span (see Diagram I., fig. 3). The arrangement of house (see Diagram I.,

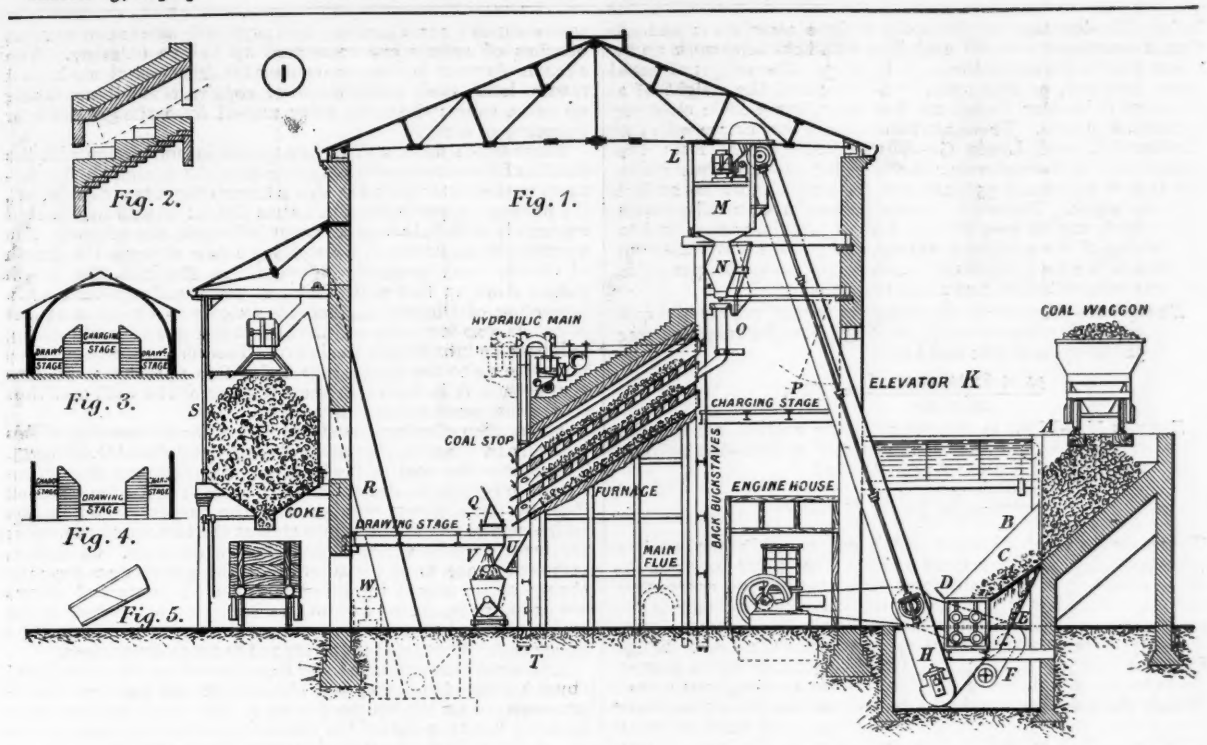
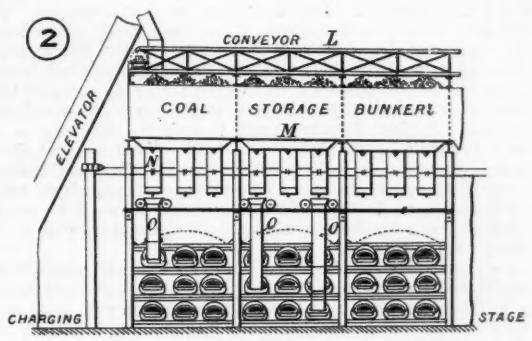
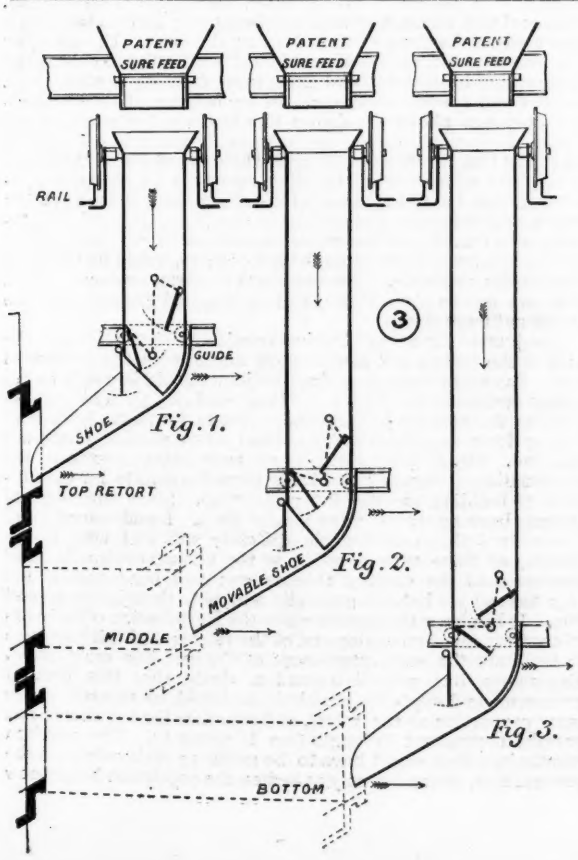
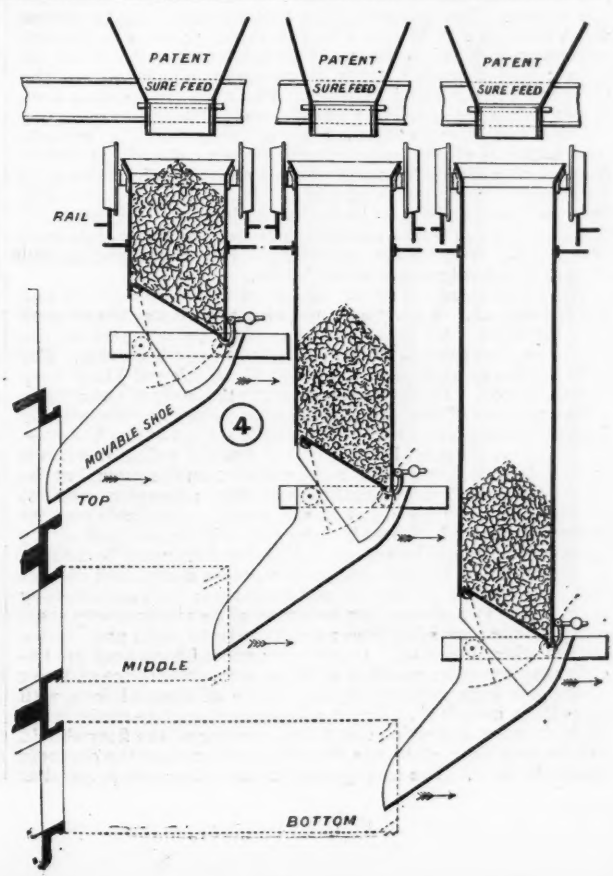


fig. 4) where the drawing stage is shown in the centre of the stacks, has not proved a success; and therefore there is no necessity to give figures for this design. Retorts 10 feet long are not now used in England. They were discarded some years ago, as the amount of labour required to charge a 10-feet retort was equal to that required for a 20-feet one.

The height of the houses for single beds of 15-feet retorts is 42 feet from the ground-line to the eaves; and for 20-feet retorts, 50 feet. The design of roof for the single building is the trussed roof, as shown in Diagram I.; but for the double house, the design adopted is either parabolic or semi, and formed of a continuous girder averaging 2 ft. 6 in. deep throughout. This style of roof lends itself admirably to the inclined system, as the absence of trussing allows the tanks and conveying plant to be fixed in the centre, and with only a small clearance. The weight of the roof falls upon the buttresses built at a distance of about 21 feet, or equals the width of two







beds. The leverage on the walls is done away with; and all that is necessary is to fill each bay with light brickwork up to the eaves, as shown in Diagram I., fig. 3. The weight of each main principal, 90 feet span, is 6 tons; and the weight of a principal of similar design 100-feet span, but a little stronger sections, is 9 tons. These are two roofs in connection with the Huddersfield and Leeds Gas-Works. The height from the ground-line to the under side of the girder, for a house suitable for 15-feet retorts, is 55 feet; and for one suitable for 20-feet retorts, 60 feet. The cost of construction in comparison with the trussed roof is less for this design. Again, with regard to the raising of the existing buildings and roofs, I have taken an average of the many roofs raised, and have made 1⅜d. per cubic foot capacity of building as a basis (approximate).

Example I.—What is the approximate cost of raising the roof and walls to an extra height of 25 feet—the building being 52 feet span and 61 feet long?

$$\frac{52 \times 61 \times 25 \times 1\frac{3}{8}}{12 \times 20} = £605$$

Example II.—What is the approximate cost of raising the roof and walls to an extra height of 23 feet—the building being 56 feet span and 71 feet long?

$$\frac{56 \times 71 \times 23 \times 1\frac{3}{8}}{12 \times 20} = £700$$

These are two out of many which came within one or two pounds of the actual tendered figure. This price does not include covering in the gable end with boarding or corrugated sheeting; nor does it provide for any extra half principals for raising the roof. It, however, includes painting and scraping.

It is preferable not to have many openings in the buildings for these inclined retorts; and I must certainly say I cannot agree to the adaptation in England of the *skeleton-frame* house. Where there are good wide stages and ventilating plates, there is no necessity for any alteration to our present brick or stone building. With regard to the ventilator on the roof, a very simple and effective method is to leave an opening about 4 feet wide the whole length. This has been found to be ample. The ventilation of the retort-house is a problem easily passed over by the engineer; but I venture to suggest that if the charging stage is made as described, and the drawing stage is left open near the beds, this induces a current of air to rise up and meet the centre current over the bench, and then exit through the ventilator. Another improvement I wish to mention is the introduction of a glass skylight instead of slates (say) 6 feet deep, and running the full length of the building, and directly over the conveying plant. This, if kept clean, gives ample light for working. In trussed roofs, the last space between the principals is used for the elevator (see Diagram I.). This is also a glass covering.

The construction of the main piers, arches, and main flue is certainly worthy of a few remarks. These piers in England are usually 1 ft. 6 in. thick; but on the Continent 2 ft. 6 in. is the recognized thickness. The centre to centre of beds ranges from 9 ft. to 12 ft. 6 in., according to the number of retorts in a bed and their size and section, and also the travel of the gases round the retorts. The arches for the inclineds are built in several ways, as shown in Diagram I., figs. 1 and 2; but the one that recommends itself is fig. 1. This arch runs parallel to the retort; and therefore there is no cavity which induces the stoppage of the travel of gases. The arch runs out at both sides; and is protected by a channel iron. This is a very useful bracing, and prevents any tendency of the arch to slip forwards. The thickness of the arches ranges from 9 inches to 14 inches. A space of 3 inches is sometimes left above the fire-brick arch for expansion; but this is more of an advantage if sand is used for filling in the spandrils, instead of stock bricks. The buttresses are usually three bricks thick for a battery of six or eight beds in a bench. When fifteen to twenty beds are erected in a line, the buttress has been put at six bricks.

The covering on the top of the bench should be stepped, and not left smooth. A great advantage introduced was the stepped springer block. By this means the block rests square on the main pier, and there is no chance whatever of it moving. For semi arches, a small piece the width of a brick and ½ inch deep is moulded on. This gives a support to the body of the arch.

The position of the main flue is one of great importance; and I agree to the plan showing it inside the setting at the bottom—as dotted on Diagram I. The loss of heat by radiation when it is placed on the top of the beds, and also on the ground at the back of the setting, is something enormous; therefore why not gain this heat by building it in the angle, or available position behind, as shown? There is also a great disadvantage in having it exposed, because the accumulation of coal dropped from above on to the top of the flue gradually becomes heated and catches fire. This affects the tie-rods and buckstays; very soon melting them. The loss of even one longitudinal tie places a very great strain on the remaining three; and it is wise to make preparation for the others breaking. In my experience, I have seen the tie-rods snap one after another within a very short space of time; and these were replaced by ties made of channel iron, with adjustable couplings. Ample allowance should be made in the main flue for expansion; and the covering of the floor should not be less than 4½ inches, to sufficiently protect the concrete from the heat. The arrangement of main dampers is one that wants careful consideration, and especially where two or more benches of retorts are connected up to one chimney. The circular damper is very convenient for this class of work, as it readily lends itself to the detail of construction without taking up extra room; the same being moved from the ground floor by means of a key.

I here touch upon one or two points in connection with the details of the retorts without going into the design of the furnace, as this latter question is of so much importance itself that, if I have an opportunity at a future date, I should like to deal separately with it, in a paper exclusively upon the subject. The several points, however, upon which I now rely are the length of retorts most generally adopted. In England, the length ranges from 15 feet to 20 feet. It will readily be seen, upon inspection of Diagram I., that it is as easy to charge a 15-feet retort as a 20-feet one, and that there is a considerable saving in labour by introducing the latter. The coal in the retort does not come up to the front of the bed within 14 inches; and also at the back it is better to keep it clear of the wall, and thus ensure that portion being carbonized.

The section of retorts most convenient for the working of this system, and ensuring successful charging and drawing, is the ⊓. This allows the coal to lay in a uniform thickness throughout its entire length, as shown in the diagram; and I have proved that, by the slightest regulation of the checks in conjunction with size and shape of the iron stop at the bottom of the retort the layer may be varied from 3 inches upwards. Of course, sufficient space must be allowed for the gas to pass over the charge on its way to the ascension-pipe. The sizes of retorts are 21 in., 22 in., 24 in., and 26 in. wide by 15 inches deep at the lower end; and 18 in., 20 in., and 22 in. by 15 inches deep at the upper end. Mouthpieces correspond to these dimensions.

It is some time ago since the taper retort was first tried and found a decided success; and although it was then somewhat inconvenient for the makers (owing to the retorts having to be made by hand) to obtain the taper, there has been found a way out of the difficulty by the addition of the expanding die to the retort-making machines already in existence. I have seen the first retorts thus made, and have set them in some work I was engaged upon at the Leeds Gas-Works. It will be interesting to note the results of the working of them as regards wear and tear. The taper on inclined retorts should not be less than 4 inches, otherwise in a length of 20 feet the taper is lost. I have tried a 6-inch taper; and I must certainly say the advantage gained in the rapid discharging of the coke fully compensated for any little reduction of carbonizing area on the floor of the retort. This question is well worth careful consideration by gas engineers, and is a point which can be recommended. The saving of labour in discharging is of more value than the small amount of coal carbonized by a parallel retort.

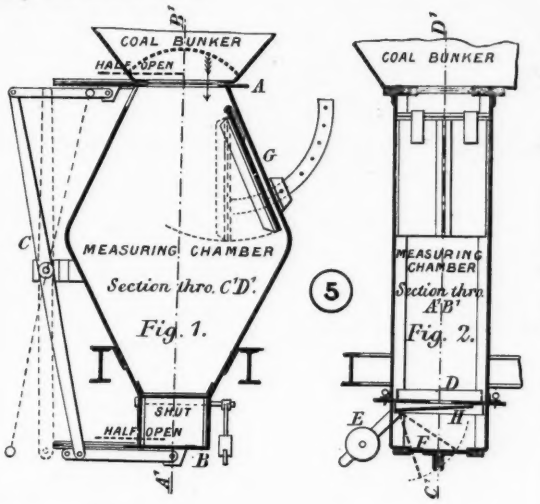
The circular section for inclined retorts is a failure. I have had experience with an installation where these were adopted; and I cannot do otherwise than condemn the section. Although it is possible to obtain an even charge of coal within the retort, the advantage of the taper, as before referred to, is not apparent when drawing the coke. In the installation just mentioned, the charges were placed into the retort to the engineer's satisfaction. The coal was carbonized and well burnt off; and an inspection was made of the charge before drawing the same. Upon pulling the iron stop out, there was considerable difficulty in getting the first portion to slide out, and much more difficulty in obtaining a regular and speedy discharge. In my opinion, the coke, in expanding, rose above the centre line of the retort and jammed itself. If circular retorts must be used, they should not contain anything like the amount of coal which is put into a ⊓-shaped one. The advantage of tapering retorts is to obtain the increased area for each portion of the charge as it slides down the retort, and reduce the amount of friction. In England, the circular retort is not used anywhere to my knowledge. The oblong or rectangular section, with rounded corners, would be the ideal section for inclineds. The drawback to them, however, is that they are not so strong as the ⊓ retorts, and cannot bear the strain put upon them.

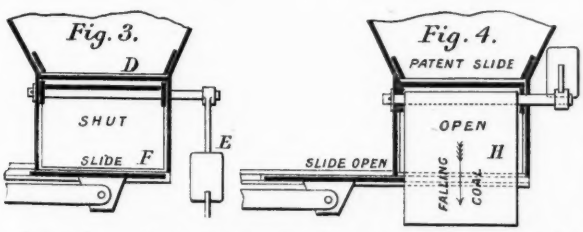
The joint of the retorts has been made at right angles with the axis of the retort, and also at right angles with the horizontal line. I venture to suggest that the joint should be made as flat and as horizontal as possible (see Diagram I., fig. 5). This method ensures the cement jointing remaining in its place, instead of falling down as is commonly noticed when vertical joints are adopted. Mr. Charles Hunt, in an early patent, protected the combination of lugs or rest-blocks upon the retorts for the purpose of building the division walls upon. Since then several patents have appeared upon similar lines. I understood from the makers that considerable difficulty was met with in the burning of these retorts, owing to the uneven contraction and expansion of the varying thicknesses; and consequently the idea has not yet become generally adopted, though it is a good one. It has been the custom since the introduction of inclineds to contract the discharging end of the retort; and this was done to facilitate the easy attachment of the cast-iron mouthpiece. Experience has proved beyond a doubt that this idea is erroneous, and that the mouthpiece should be tapered in the same proportion as the retort, and also that the top should run parallel throughout its length (see Diagram I.). The cast-iron mouthpiece then would have to be made 17 inches deep on the vertical line, instead of only 15 inches, the regulation height now

supplied. The advantage of this alteration in detail would be that the bolt-holes in the retort mouth would all be at an angle similar to that of the retort, and not at varying angles.

The flanges of the mouthpieces are preferably made like a socket, and encircle the retort mouth. This is easily done when the retort is made as shown in Diagrams III. and IV. The front and back ends of the retorts should come flush with the brick-work, and not have the cast-iron mouthpieces bedded in. This latter arrangement may be very well for horizontals; but in inclineds there must be an allowance of at least 2 inches all round, to make a joint and push the flange in its place. This, being afterwards filled up with cement, does not add to the appearance of the front and back walls.

It has been repeated over and over again that great advantage would be gained, not only by gas engineers, but also by contractors, if the mouthpieces and templates of inclined retorts were standardized; and if only engineers of large works took the matter in hand, a satisfactory basis could be arrived at. With horizontals, this is impossible; but with inclineds, the time is now ripe for the movement. It is only necessary to take up a catalogue of retort makers and gas engineers, and one will see the many patterns in stock up to that date, and yet increasing. If a standard existed, manufacturers could make to stock in the winter months; and gas engineers, when requiring a few retorts hurriedly, would then obtain a speedy delivery. At present, with so many sections in horizontals, the buyer has to wait patiently until his turn comes to put through his special shape. The retorts for each system are of the same thickness, both in the body and in the mouth.





It will be noticed that the top tier of retorts is out of the reach of an ordinary sized man; and therefore a light wooden stool is used on the charging stage for ease in working. This is made of ¾-inch matchboard. The height of the retorts is regulated by the distance between their bodies, and also upon the settled distance between the stage and the bottom retort (see Diagram I., fig. 1), which should not be less than 2 ft. 6 in. at the root. The distance between the retorts should also be regulated by the current of the furnace gases. The cast-iron top retort mouthpiece, I suggest, should be only 3 or 4 inches deep at the most. This I have noticed prevents any undue radiation of heat on the top stage, and is not only an advantage to the heat of the retort, but also is cooler for the stoker charging the retorts. The addition of shields upon the lower mouthpieces is of very great importance to the drawing of the retorts, and also prevents the deposit of tar upon the fastenings of the mouthpiece below. The angle of inclination of the retort is of the utmost importance. The angle of repose is different for all materials and for all varieties of coal; and although this point has been laid as the basis upon which inclineds are built, I cannot myself agree with it. The introduction of the iron stop in the lower part of the retort, for stopping the coal, upsets the proposed theoretical basis or angle of repose.

The angle that the retorts were first tried at was 29° to 31°; and I remember in 1890 the angle at the Rochdale Gas-Works was fixed at 30°, 31°, and 31½°. This was done to facilitate the even charging of the varying heights of the retorts, and compensate for the three different falls from the coal-hopper above. This variation in degrees has since been found unnecessary, because the speed and delivery is regulated to a nicety by the shoot. Taking into consideration the varying qualities of coal, from damp slack to lively coal, the average angle is settled at 32°, although I suggest that where small coal is generally used—especially in works on the seaboard, receiving their coal by boat, which has had two or three handlings, and becomes pulverized—that the angle should be 34° from the horizontal line.

It often happens that the coal has been stored in the open air for some time; and having no covering, it is naturally highly charged with water. When the storage tanks are filled for the night, and the damp coal lies in them until the morning, it is very difficult to prevent an arch being formed over the opening to the chamber which is underneath; and this prevents the coal entering the chamber (see Diagram V., fig. 1). This damp slack does not slide down the shoot as readily as the lively coal; nor does it enter the retort at the same speed. It is always necessary then to increase the area of the exits in the chamber and shoots, and give it a higher velocity (see slides D, fig. 2, Diagram V.). When it is carbonized, although it is a more compact mass, it requires a steeper angle to discharge; and this in my opinion should be not less than 34° also.

A point which is well worth notice is the angle of the two end beds. This should be different to that of the other beds, owing to the two end tanks receiving a much larger percentage of dust. The conveyor, when working, carries along on the chains and skidders, though in very small quantities, fine dust; and this is deposited in the end tank. The first tank receives the dust made by the delivery spout. To compensate for this fine material, there should be a slight variation in the angle of these two beds.

We now come to the general ironwork and superstructure in connection with the bracing and supports. For the buckstays, stiffeners, and stages, the most convenient is the HS section, as this affords easy attachments by cleats and brackets. The mouthpieces mentioned should be self-sealing, and not less than ⅜ inch thick. This is the least margin of safety; and even this is very risky, as experience has proved. The bottom mouthpiece should be provided with either a stop bolt or a recess, for the coal-stop to rest in. The recess is very good if kept clean; but unless this is the case, the falling coal pushes the coal-stop into the lower mouthpiece, and consequently the latter becomes blocked up. The weight of the ascension-pipes should not be upon the bottom mouthpiece; and this can be overcome by having a flange joint attached to the bridge-pipe, which is supported by a longitudinal joist on the cross stays, as shown in Diagram I.

I am of the opinion that it is absolutely necessary to have strong and efficient bracing, both across the retorts and across the setting, wherever there is any great heat. I may be queried upon this point; but in all cases engineers have agreed, after having had experience without bracing. I have seen a case of the retorts having moved forward, and pulled the ascension-pipes out of plumb and upset the level of the hydraulic main. The ascension-pipes are preferably not less than 7 inches in diameter. This is a nice size; and taking into consideration that all the gas goes up one pipe, and it has to stand the pressure at the time of the greatest distillation, I do not think it advisable to adopt a less size even for 15-feet retorts.

There has been some discussion about the decrease in the illuminating power where inclined retorts are used. The theory put forward generally has been that the gas has to travel over a 20-feet length of retort before its exit; and consequently this lengthy travel over the heated surface takes out certain hydrocarbons. Now a very simple experiment is to put two plate-glass doors in the place of the cleaning-out doors in the hydraulic main, when it will be noticed that in a 20-feet horizontal through retort the two ascension-pipes do not work together. One will work for a little time and stop; and the other then commences. This is caused by the momentary variation in the pressure; and at the same time it shows that one pipe does the work, even with horizontals. The position of the hydraulic is somewhat higher than for horizontals, and can either be over the beds or in front, as shown by the dotted lines on Diagram I., fig. 1. The detail of this would be the same as for horizontals, so I will not touch upon it.

Passing on to the drawing of the coke and tools for same, there should be a moveable screen Q for protecting the stoker, and also for directing the coke underneath the stage. This should be about 4 ft. 6 in. high. The conducting shoot U attached to the drawing stage should be made so that the coke is directed into the truck, and does not scatter over the floor of the retort-house. A water spray V may be here introduced, for slaking the coke in the waggons; or the waggons may be run outside and slaked in a shaft provided for the purpose. The conveyance of hot coke by means of conveyors has been carried on for some considerable time; and great credit is due to those engineers who have made such vast improvements in this direction. Though the wear and tear is somewhat greater than upon those for cold coke, still the saving in labour covers all the extra expense.

The scraping conveyor with push-plates for hot coke is hardly a success. The friction of the moving chain sliding along the bottom of the cast-iron trough of the conveyor, together with the coke (which is one of the worst substances to deal with), is excessive. Various methods have been tried; but though the push-plate scraping conveyors for this hot material may work

well for a time, they soon get out of order. A very serviceable conveyor is made by having a trough about 2 feet wide, with a chain working in it. Connected to it are a series of bars made of 1 inch diameter iron. These bars are placed at a distance centre to centre of about 3 feet. The boss of the chain only runs on the bottom of the trough; and this boss is of peculiar shape, and formed with a curved nose. The coke lies in the trough, and the bars pull it along. Water runs in the trough; and the stream is concentrated at one spot—generally at the exit. The delivery of the hot coke on to the conveyor is at no fixed point; and it takes place at intervals of (say) an hour, when the full load comes on all at once. The consequence of this is that the uneven contraction and expansion of the chain alters the pitch of the links, and the chain does not ride correctly over the drum. The push-plates are also greatly buckled by the falling coke. The pan conveyor, however, if recessed, can be made much more serviceable for this purpose. When we can obtain a better mixture of metal for this class of work, it will be an advantage. Manganese steel would no doubt be a great improvement. In the pan or tray conveyor method, the coke is not moved by scraping, but carried as upon a belt; and therefore the friction is reduced considerably.

The system of small tilting trucks, as shown in the diagram, is one that readily commends itself. The coke falls down into the trucks, one charge per truck. These can be run along on a secondary line near the wall of the retort-house, especially in the case of a long line of beds, where two or three gangs are at work at once. They can then be taken out by means of a small engine, or by a creeper chain or wire-rope haulage. The trucks, when outside, can be automatically tipped at any convenient position on the coke heap. The direct feeding from inclined retorts on to a conveyor, would encounter the drawback of having such large lumps of coke to deal with, which in many cases are 3 and 4 feet long, especially when a retort speedily discharges itself. The breaking of this fall would have to be done by a series of baffle-plates.

The conveying of cold coke has been a success for some considerable time, and especially when the coke is drawn on to the floor of the retort-house, then quenched, and afterwards forked into a conveyor which runs in a trench below the ground-line, or is erected on the ground level, so that the breeze is easily cleaned from underneath it (see W, Diagram I., fig. 1). The trays, however, must be at least ¼ inch thick; and the width of the conveyor should in no way be stinted, owing to the irregular feeding. Little details, such as cleaning brushes, &c., should on no account be forgotten. The speed of the conveyor should be from 80 to 90 feet per minute. On Diagram VI., I give a very handy and useful rule for finding the horse power required to drive elevators and conveyors, and which is applicable for any design and for any class of material carried.

DIAGRAM VI.

FORMULÆ FOR COMPUTING THE NECESSARY HORSE POWER TO DRIVE ELEVATORS, ETC.

M = Weight of material on plant.
W = Weight of chains, buckets, trays, &c.
S = Speed per minute, in feet.
k = Coefficient of friction.

Case 1 = sum of coefficients of friction of shaft bearings and chain.
Cases 2 & 3 = sum of coefficients of friction for shaft bearings, chain, and guides.

θ = Angle of inclination with horizon.

Formula 1.—*Vertical Elevator.*

$$HP = \frac{M \times S}{33{,}000} + \frac{k\,S\,(M + W)}{33{,}000}$$

Formula 2.—*Inclined Elevator.*

$$HP = \frac{(M \times S \times \sin\theta)}{33{,}000} + \frac{k\,S\,(M + W) \times \cos}{33{,}000}$$

Formula 3.—*Horizontal Conveyor.*

$$HP = \frac{k\,S\,(M + W)}{33{,}000}$$

(To be continued.)

Public Lighting by Acetylene.—The market-place of the town of Beeskow, near Potsdam, is to be lighted provisionally by acetylene. The installation is furnished "on approval" by a Berlin firm, which hopes to satisfy the town authorities as to the superior advantages of the new illuminant. The installation for the supply of 1000 flames is to cost from £1500 to £2000.

Acetylene Lighting in Berlin.—Several installations of acetylene generators for the supply of from 200 to 1000 flames have lately been provided in Berlin by local firms. Among the places there which now have plant for the production of acetylene for general lighting, are a large brewery in the Moabit quarter, the Electoral park at Halensee, and a large tile-works in the suburbs. Several droskies (cabs) provided with acetylene lighting are now plying for hire. Acetylene played a very important part in the illuminations on the occasion of the celebration of the Emperor's birthday a few weeks ago. At one of the largest acetylene and carbide works in the city a slight explosion recently inflicted severe injuries on a workman whose carelessness was alleged to be the cause of the accident.

REGISTER OF PATENTS.

Gas-Motors.—Brewer, E. G.; a communication from P. Nicolas, of Paris. No. 5522; March 2, 1897.

This gas-motor is specially characterized: First, by the arrangement of the admission box or mixing chamber for the explosive mixture. Secondly, by the mode of connection of the several connecting-rods with the crank-shaft. Thirdly, by the exhaust mechanism for the burnt gases.

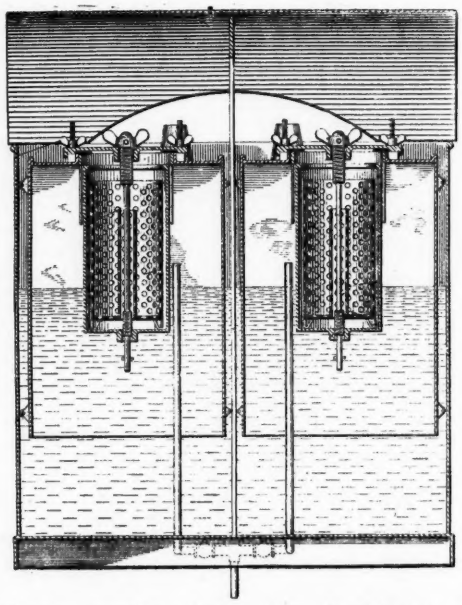
The motor is composed of four cylinders, arranged radially at 90° from each other, in a vertical plane, provided with wings or projecting flanges; and the claims for novelty consist: (1) In the air-mixing box operating automatically by the suction of the pistons and by the opening of a single valve; the box containing an air-chamber and a gas-chamber communicating with one another by small holes, which are uncovered by a moveable diaphragm during the time of suction and closed by the diaphragm, forced by the gas, as soon as the admission-valve is closed. (2) In a mode of coupling the connecting-rods on to the driving crank axle of a motor having several cylinders, consisting in the heads of the connecting-rods having the form of sectors, and the exterior conical surfaces of which are covered by rings conical internally, which allow of compensation in wear. (3) In means for the escape of the burnt gases, composed of valves worked by a cam revolved at half the speed of the motor shaft, and having acting surfaces situated in different planes of rotation.

Gas and Oil Engines.—Tournet, E. L., of Birmingham. No. 6645; March 13, 1897.

In double cylinder oil and gas engines, the patentee proposes the employment with the two exhaust-valves arranged side by side of mechanism for opening each of the valves once at every two revolutions of the crank-shaft, consisting of a slide which receives a to-and-fro motion from the crank-shaft by an eccentric and strap, or the like. The tappet-rod is jointed to the slide, and moves with it. The swinging cam plate with which the outer end of the tappet-rod engages imparts a sideways swinging movement to the tappet-rod, so that, as the slide and tappet-rod advance towards the exhaust-valves, the tappet-rod strikes the exhaust-valve spindles alternately, and each exhaust-valve is opened once every two revolutions of the crank-shaft.

Acetylene Generators.—Lyons, T. & J., and Pearson, J., of Blackburn. No. 7043; March 18, 1897.

The object of this invention is to provide acetylene apparatus in such a way as to prevent the escape of any gas when the apparatus is being charged with calcium carbide, and thereby to minimize danger—the caps or covers of the generator being securely fixed in position and made gas-tight before the vessel containing the carbide is lowered into contact with the water, which causes the gas to generate.



The apparatus comprises a tank or cistern, in which is a gasholder free to rise and fall in the usual manner. In the top of the holder is a hole, through which is passed a cylinder or vessel, inside which is a perforated vessel where the calcium carbide is placed. The apparatus is shown in duplicate; and as the contents of one gasholder are being withdrawn, the other can be charged. There is a division-plate in the tank, serving as a guide or steadying-piece for both holders.

The apparatus is charged by first removing the cover, and then lifting out the carbide cylinder or vessel. Calcium carbide is now placed in the inner vessel, which is screwed up tight. It is placed back in position, and hermetically closed, by screwing on the cap or cover, before any water touches the carbide, and consequently before any gas is generated. When all is made secure, the central spindle is turned in one direction by the winged nut, and the boss withdrawn from the hole at foot, so that the cylinder drops until it is caught by the stop-pin. The water from the tank then rises through the hole into the chamber to the calcium carbide, and gas is generated and passes to the storage holder.

Internal Combustion Engines.—Hargreaves, J. R., of Norwich. No. 6651; March 13, 1897.

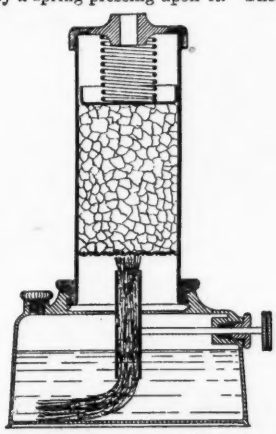
This invention, relating to internal combustion engines, has for its object to provide means whereby the entire products of combustion will

be swept out of the cylinder before a fresh charge is drawn in. Hitherto (as the patentee points out) the pistons and cylinders of internal combustion engines have generally been so proportioned that the piston does not at any period of the stroke reach the end of the cylinder—that is to say, the internal capacity of the cylinder is never reduced to zero at any part of the stroke. In consequence of this, at the end of the exhaust stroke, and before the fresh charge is drawn into the cylinder, there still remain some products of combustion from the previous explosion, which mixes with the fresh charge of explosive mixture; and owing to the dilution of the explosive charge by the waste products, the energy of the explosion is diminished so that the engine cannot work at full capacity.

According to the present invention, the piston is arranged to reduce the volume of the working cylinder to nothing before drawing in the fresh explosive charge; but when the explosive charge has been drawn in, it is compressed on the next stroke of the piston; and since the charge cannot be compressed so far as to fill no space, an auxiliary cylinder is provided in connection with the working cylinder, to receive the explosive charge during the compression stroke. This auxiliary cylinder is preferably made with an internal capacity equal to the capacity to which it is desired to compress the charge; and it is provided with a loose piston furnished with a spring or weight, which tends to maintain the piston at one end of the cylinder, and so reduce its internal capacity to its smallest dimensions.

Acetylene Generators.—Kitchen, J. G. A., of Manchester. No. 8270; March 31, 1897.

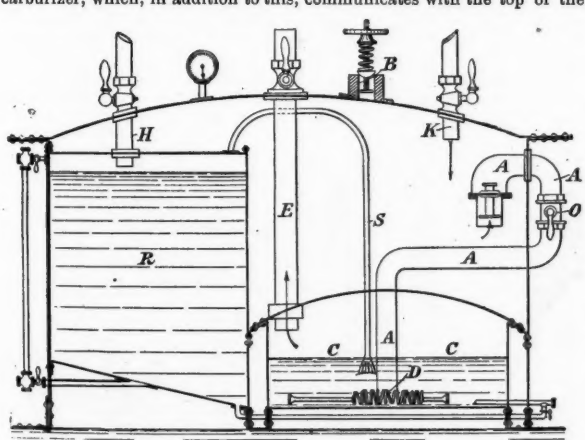
In this apparatus (as shown) there is a lower vessel to contain liquid having a wick-tube fitted with a feeding wheel. Above the well is a chamber, having a perforated bottom or grating and a gas-tight removable cover. There is a central outlet orifice in the cover for conducting the gas away. The upper chamber contains a pusher, consisting of a plate which has preferably a spring pressing upon it. There is a vent-hole in



the wick-tube, to allow the gas generated to pass into the water-vessel above the water-line when the water rises above the lower end of the wick-tube. Through the cover of the upper vessel the carbide is introduced, preferably granulated; and as it becomes decomposed by the moisture drawn up by the wick being fed up to come in contact with the grating, the pressure of the spring upon the pusher-plate forces the carbide down upon the grating—the decomposed part passing through the grating into the well beneath, while the gas produced rises through the granulated carbide.

Air Carburetting Apparatus.—Lothammer, F. J., of Brussels. No. 19,889; Aug. 28, 1897.

The apparatus shown for carrying out this "process of carburizing cold air" consists of an air-tight holder, within which are arranged the hydrocarbon receiver R and carburizer C. Through the dome of the holder passes the hydrocarbon-supply tube H. From the base of the receiver, a tube provided with a tap conducts the hydrocarbon into the carburizer, which, in addition to this, communicates with the top of the



receiver through a pipe S, plunging into the carburizer, and adapted to maintain a constant level in same. Within, and co-axially with, the carburizer, the air-supply pipe A extends downwards; being fitted at its lower end with an air-distributor or feeder proper D, immersed in the hydrocarbon in close proximity to the carburizer.

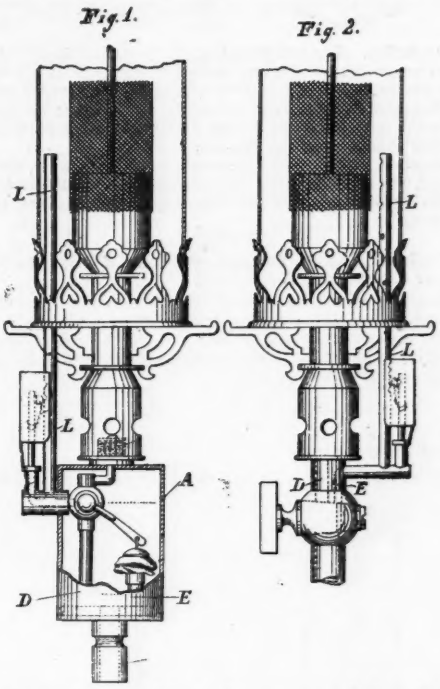
This distributor consists of a number of pipes arranged radially around the lower extremity of the supply-pipe A. The outer extremities of the pipes are made bell-shaped, and flattened so as to form a narrow slit for the discharge of the air; the inside edges of the slit being serrated so as to finely divide the air injected through the pipes. The apertures of the pipes are spread as much as possible over the whole sectional surface of the reservoir; and for this purpose the pipes are made of varying lengths. The air-bubbles issuing from the pipes being charged with hydrocarbon, and being of very small size, will, it is claimed, in bursting, "ensure the formation of a rich and homogeneous mixture." Moreover, the pipes being of variable lengths, "the air causes the hydrocarbon to rise in bubbles at a number of different points, and becomes carburized to a degree approximating saturation or (at any rate) to a condition of richness equal to that of the liquid."

The air-supply pipe A, for a portion of its length, projects from the holder, so as to allow for the insertion of a valve O serving to cut off the connection when required; and above the valve it re-enters the holder with its bent or knee-shaped end, in which there is located a double-acting valve, through which air passes to the carburizer. The carburizer is, moreover, surmounted by the discharge-pipe E.

The air employed in feeding the carburizer is first delivered into the holder, by the action of a compressor, through the pipe K; and the air in the holder is maintained at a constant pressure by a weighted valve B—the pressure of the spring, whereby it is so weighted, being correspondingly regulated.

Igniting Gas-Jets.—Bachner, A., of Berlin. No. 27,395; Nov. 22, 1897.

This invention relates to apparatus (to be employed in various forms) for igniting gas-jets, arranged outside the jet that it regulates. Fig. 1 shows an arrangement which is automatically and mechanically operated. Fig. 2 shows a similar arrangement, ignited directly by hand.



In fig. 1, gas enters a casing A, whence gas-supply branches lead in two directions, towards D and E. Above E there is arranged an expansible bladder, connected with a lever mounted directly upon the tap-plug. From this tap there leads a pipe, which has two branches—one communicating with the igniting-device and an igniting-pill fixed on a platinum wire. The pill and wire are contained in an igniting casing or sleeve, whereby a shifting of the relative positions of the parts is rendered impossible. From the same pipe, there also leads the igniting-tube proper L, which is provided with a series of perforations, and projects somewhat beyond the burner-cap. From the tap there also extends a tubular piece, which opens into a screw-threaded part upon which the burner is simply screwed.

In fig. 2 almost all the parts are as in fig. 1; but in this case the tap is operated by hand, and not through the medium of a bladder. In this instance also the gas inlet-pipe divides into two pipes or passages D and E. The pipe E again carries the igniting-tube L with its apertures, together with the igniting-device proper consisting of the pill, the wire, and the igniting-sleeve. The regulation of the gas admission is effected in this case by means of a tap formed with a through passage, and at its end corresponding to the passage E, with a groove which does not extend quite around it.

Atmospheric Burners.—Clark, A. M.; a communication from the Diamond Light Company, of New York. No. 28,384; Dec. 1, 1897.

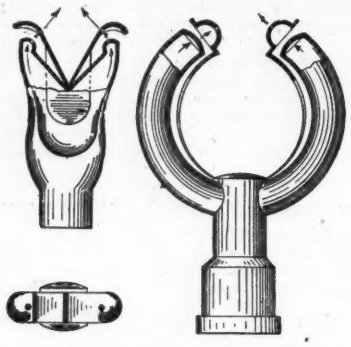
The object of this invention (which is illustrated by a view of an incandescent burner of the Sunlight type) is to produce a bunsen arrangement "wherein the common liability of flickering and unsteady light will be obviated."

The mixing chamber comprises an inner apertured casing and a surrounding outer apertured casing, placed with respect to each other in such manner as to bring each of the apertures of the outer casing opposite a solid portion of the wall of the inner casing. Combined with this is a perforated air-shutter, for regulating the admission of air to the apertures of the outer casing. Straight cut apertures are also combined with the air-shutter surrounding the outer casing, having dumb-bell

shaped apertures co-operating with the straight-cut apertures of the outer casing so as to regulate the air supply thereto. Combined with the mantle support is a cup or collar with a plurality of standards guiding the cup, and coiled springs surrounding the standards and supporting the cup.

Burners for Acetylene Gas.—Falbe, O., and Borchardt, E., of Berlin. No. 27,536; Nov. 23, 1897.

In order to prevent the choking of acetylene burners and to facilitate their cleaning, the patentees propose to cover the burner-mouth with a hood or cap provided with a somewhat larger opening than the burner-mouth, so that a free passage to the emerging gas-jet is obtained, and the flame only burns above the covering cap, and does not directly extend to

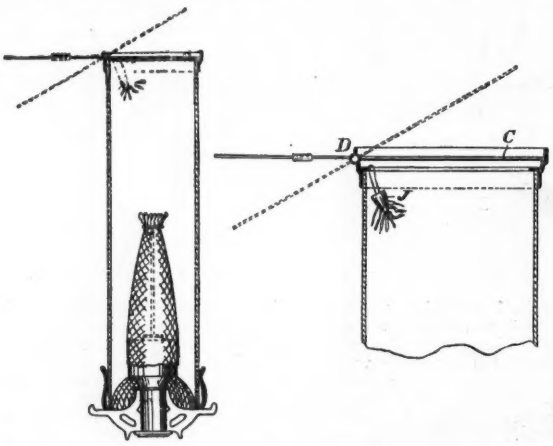


the burner opening. The residues of combustion thus deposited cannot choke the narrow burner-passage, as any stoppage of the hole in the covering cap or hood is almost entirely prevented, owing to the hole being considerably larger than the burner opening. If, however, the passage in the cap should become choked, it can be cleaned, as it is of sufficient width to allow of this being readily done.

Two methods of carrying out the invention are shown; but the form of the covering cap is immaterial—the essential feature of the invention consisting in "providing the actual burner opening with a cap having a larger opening."

Igniter for Incandescent Burners.—Mahnke, G., and Kraft, C., of Cologne. No. 28,709; Dec. 4, 1897.

This invention relates to a gas-igniting arrangement, in which the platinum sponge which causes the ignition of the gas is attached to the metal-plate "crown" or ledge, in such a way as to ensure that, when the valve or flap is open, the platinum sponge may not be brought into contact with the combustion gases.



The chimney has a crown, which, on the one hand, serves as a support for the closing flap or valve C; while, on the other hand, it supports a platinum wire carrying a platinum-sponge pilule J. The valve is hinged at D; and by means of a piece of bent-up metal-plate attached (after the manner of a clip) to the extension projecting from the flap or valve beyond D, it is so evenly balanced as to be easily raised by the ascending current of gases, while on the extinction of the flame it will fall back upon its seat. The chimney is shut off, from beneath, by a sieve of perforated wire-gauze. On turning on the gas-cock, gas will, in the first place, accumulate underneath the flap or valve C, in consequence of which the pilule J will be rendered incandescent. This causes the little wires of platinum or other refractory material attached to it to become likewise incandescent, so as to ignite the gas. The current of hot gases thus set up will open the flap or valve C; and the ascending current of gases will take its course towards the main orifice, so that the pilule, which is placed a little to the back, will be but slightly affected.

Manufacture of Gas.—Russell, W. H. & G. E., of Hasbrouck Heights, N.J., U.S.A. No. 29,234; Dec. 10, 1897.

This invention relates to the generation of gas in a continuous manner from acidulated water, by the combined agencies of chemical reaction and electrolysis (whereby heat is produced in the generating apparatus), and simultaneously and continuously forcing air into the generator, whereby the gases are combined under the influence of heat before being led—after carburation—to the point of ignition.

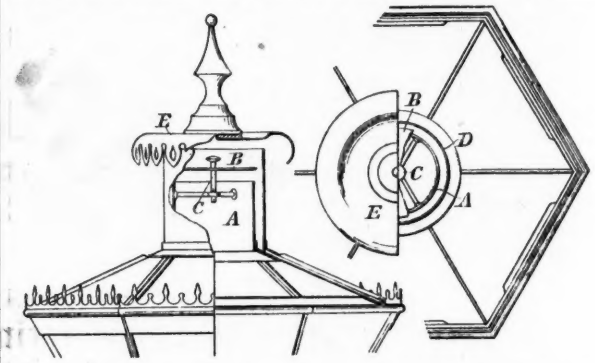
Incandescent Gas Mantles.—Puchmüller, B., of Schoeneberg, near Berlin. No. 49; Jan. 1, 1898.

This invention relates to an improvement in the fluid described in patent No. 3811 of 1897 (*ante*, p. 405) "for impregnating bodies or suitable fabrics, threads, fibres, or the like for incandescent lighting."

The present improvement consists in adding to the oxides or nitrates of strontium and zirconium and the light-giving oxides in the process of preparing the fluid as mentioned in the previous patent, the oxides or nitrates of barium and aluminium; the process and fluid in other respects remaining the same. Oxide of barium when used alone only produces an ash, which falls to pieces at the slightest touch; and oxide of aluminium if used alone would melt during the burning off in a pressure gas-flame, to the complete destruction of the skeleton. By the combination of the oxides or nitrates of barium and aluminium with the other ingredients set forth in the previous patent, however, a fluid is said to be obtained by means of which fabrics impregnated therewith, and burnt off after being dried, "are converted into an incandescent body, skeleton, or mantle of great durability and light-giving properties."

Ventilating Gas-Lanterns.—Herring, W. R., of Edinburgh. No. 558; Jan. 8, 1898.

The patentee claims the application of a floating disc of talc or other non-combustible material to the flue of a gas-lamp lantern, arranged and operating as shown in the accompanying engraving. The disc is held in the central position over the flue, by being threaded upon a central stem or pin. Outside of the flue and projecting about 2 inches above the level of the disc, a casing of metal is carried up, capped with any form of ornamental finial that will prevent the rain falling through. When the lantern is out of use, the disc rests upon the top of the flue communicating with the interior of the lantern, and completely closes it to either wind or dust. On lighting the lamp, the heated air possesses

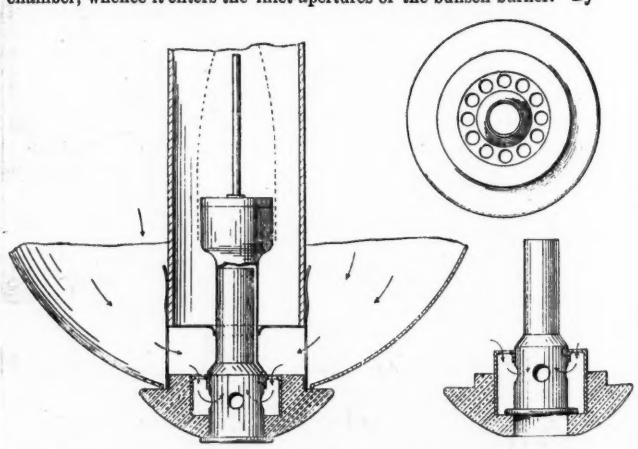


sufficient inertia to lift the disc and permit of the escape of the products of combustion. In the event, however, of a passing current of air finding access to the upper part of the lantern, the disc momentarily closes, and prevents the disturbance of the inner flame—immediately lifting again when the down-draught pressure of air current has ceased to exert itself, which "as is well known is only momentarily."

A represents the flue by which the products of combustion escape; B, the floating disc of mica, talc, or other non-combustible material, which covers the flue; C, the pin by which the disc is guided in its up and down movement, and retained in its proper position; D, the outer metal casing surrounding the flue; and E, the finial by which the disc is protected from rain.

Incandescent Gas-Burners.—Keysser, A., of Hanover. No. 793; Jan. 11, 1898.

This invention consists "in heating the air before it comes in contact with the illuminating gas similarly to the principle of a Siemens regenerator lamp." The air is not drawn in directly from below, but flows from the top down between a globe and the cylinder, and into a chamber, whence it enters the inlet-apertures of the bunsen burner. By

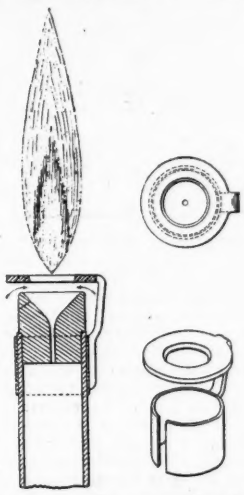


this means, says the patentee, "not only does the air become considerably heated, but the extremely sensitive incandescent mantle is also completely protected from direct draught, and will therefore last longer than heretofore."

Two forms of the burner arrangement are shown; and the mode in which they act does not need further explanation.

Preventing the Formation of Soot on Acetylene Burners.—Schülke, E. H. J., of Berlin. No. 926; Jan. 12, 1898.

The patentee mentions the well-known fact that hitherto the great disadvantage in connection with acetylene burners has been that at low gas pressure, the flame formed soot at the outlet, so that the action of the burner was impaired, and it was eventually rendered altogether useless. He proposes to avoid this drawback by providing above the outlet of the burner a disc or plate, with an opening in it corresponding to the outlet



of the burner. This acts in such manner that the out-going stream of gas is set into flame only at, or above, the opening in the disc; whereas in the space between the opening of the burner and the guard-plate or recessed disc, ignition or formation of flame does not take place. An increase of the air supply is also attained, in consequence of the stronger draught; so that "the acetylene gas is completely consumed, and even at low gas pressure the formation of soot is entirely avoided."

The illustration shows a longitudinal section of the upper part of a burner provided with the guard-plate or recessed disc; a plan view; and a perspective view of the guard-plate and sleeve for attaching it to the burner-tube.

APPLICATIONS FOR LETTERS PATENT.

1985A.—Bower, G., "Manufacture of carbide of calcium." A communication from J. E. Hewes. March 4.

4837.—Legge, J. St. C., and Cooper, A. S., "Generating acetylene gas." Feb. 28.

4839.—Rushworth, S. P., "Chimneys and globes for gas-brackets and the like." Feb. 28.

4856.—Jacquot, J., "Producing acetylene gas." Feb. 28.

4866.—Bower, G., "Making calcium carbide." A communication from J. E. Hewes. Feb. 28.

4885.—Wilms, E., "Gas cooking-stove apparatus." Feb. 28.

4901.—Sugg, W. T., "Gas-governors." Feb. 28.

4902.—Parkinson, W. C., "Coin-freed gas-meters." Feb. 28.

5011.—Ihle, G., and Bachmann, P., "Automatic igniter for gas-lamps." March 1.

5020.—Bauer, F., and Woschnagg, V. J., "Producing acetylene gas." March 1.

5025.—Burdick, C. L., "Pressure gauges for water and other fluids." March 1.

5026.—Petereit, A. H., "Burners for incandescent gas lights." March 1.

5040.—Drechsel, A. E. L., and Günther, C. R., "Fabric for incandescent mantles." March 1.

5091.—Port, A. W., "Chimneys for gas-lamps and the like." March 2.

5119.—Hallberg, D. V., "Water-meters." March 2.

5145.—Comings, W. R., "Incandescent gas burners and mantles." March 2.

5180.—Gearing, E. G., "Acetylene generating apparatus." March 2.

5208.—The Actiengesellschaft für Fabrikation von Broncewaaren und Zinkguss vorm., J. C. Spinn and Sohn, and S. J. von Romocki, "Electrically operated gas-valves for burners." March 3.

5224.—Berthold, C. E. J., "Mantles for incandescent gas-lamps." March 3.

5231.—Biddles, A., "Incandescent gas-light fittings." March 3.

5278.—Biheller, S., "Shades for incandescent gas lights." March 3.

5317.—Bauer, E., Fried, F., and Bredel, J., "Manufacturing acetylene gas." March 4.

5342.—White, C. & T. H., "Controlling bye-pass or flash-light burners." March 4.

5344.—Foster, F. P., and Puchmüller, G., "Fluids for impregnating bodies for incandescent lighting purposes." March 4.

5359.—Glover, R. T. & J. G., "Improvements in nozzles, specially applicable for bunsen burners." March 4.

5407.—Kirkham, H., "Abstraction of impurities from coal and other gases." March 5.

5442.—Lauder, T., and Ross, J., "Reversing valves for regenerative furnaces." March 5.

5479.—Faludi, W., "Acetylene apparatus." March 5.

5497-8.—Hvüd, L. P., "Producing acetylene gas." March 5.

New Water Filtration Works for Tunbridge Wells.—The Borough Surveyor of Tunbridge Wells (Mr. E. Mellor) has submitted to the Water Committee of the Town Council a scheme for new filtration works at Pembury, where the reservoirs are situated. The estimated cost of the works is about £20,000.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Mr. Provand on Workmen's Compensation.

Sir,—Your issue of 1st inst. contains much the best criticism I have yet seen of the paper I recently read before the Society of Arts on "Workmen's Compensation." In thanking you for this, I have to notice that you describe me as a director of public companies. As a matter of fact, I am connected with only one public company.

My paper was not, of course, exhaustive, as I limited myself to three-quarters of an hour, to give time for discussion. I did not say anything at all as to why Trade Union officials were in favour of Mr. Asquith's Bill, as I had already dealt with that in magazine articles written some years ago. I think the last occasion was in the "Nineteenth Century" in 1894.

A. D. Provand.

March 9, 1898.

The Cost of Hand and Machine Stoking at East Greenwich.

Sir,—Referring to Mr. Tysoe's communication in your issue of the 8th inst., in which he calls attention to some statements made in my Inaugural Address to the Midland Association of Gas Managers, respecting the cost and working of stoking machinery as compared with hand labour and inclined retorts, I desire to point out that the figures I gave were taken from papers read by Mr. Tysoe on Nov. 12, 1891, and May 10, 1894, and also from a paper read by Mr. West in July, 1891.

Mr. Tysoe in 1891 stated that the cost of labour for working power machines was only 9·6d. per ton of coal carbonized, and 22·15d. for hand labour; and that the saving per ton for labour only was 12·55d. To these figures he added 2·1d. per ton as the cost for maintenance and repairs of the machines, and 0·75d. per ton as the cost of maintenance of tools for hand labour; bringing the cost of machine work up to 11·7d. per ton, and hand work up to 22·9d. This showed a net saving of 11·2d. per ton of coal carbonized by machinery. In 1894, Mr. Tysoe gave the cost of labour only for working the Foulis-Arrol machines as 9·3d. per ton, and for hand work 25·6d.—showing a saving for labour only of 16·3d. per ton. To these figures he adds 3·2d. for maintenance, fuel, &c., 10 per cent. for interest and depreciation of machinery, and 0·7d. for maintenance of tools for hand labour—showing a net saving of 13·8d. per ton of coal carbonized by machinery. The above figures do not include other labour items common to both systems of carbonization, and estimated by Mr. Tysoe in 1894 as being about 6d. per ton.

Mr. West, in 1891, put the cost of working 18 beds of ten retorts each, or 360 mouthpieces, at the East Greenwich works, at 13·14d. per ton for machinery, as compared with 28·9d. for hand labour; or a saving for labour only of 15·76d. per ton. From this latter figure, he deducts 3d. for wear and tear, interest, &c., on machinery over and above that for hand labour—showing a net saving of 12·76d. per ton of coal carbonized by machinery. Since that time, the same machines have been working on 27 beds of ten retorts, or 540 mouthpieces, thus doing 50 per cent. more work than formerly, with the same number of men drawing and charging the retorts. This work I said was being done for 9d. per ton, and omitted to add that it was for labour only, which I believe Mr. Tysoe will admit is well within the mark.

The point I particularly desired to bring out in my address was the saving of one system over another; and I did not imagine that anyone would mistake the figure given as the whole of the charges of carbonization. I admit that, in so doing, I followed bad precedent. Mr. Tysoe's comparison in your last issue has, I am glad to say, made everything quite clear and intelligible, by including all charges common to both systems—such as machinemen, stokers, firemen, engine and boiler attendants, foremen, &c. In the case of machinery, he has also included wear and tear, maintenance, and interest on cost of machinery. At the East Greenwich works, where five tiers of retorts are worked by hand, it is necessary to have large travelling trolleys running in front of the retorts, to draw and charge the upper tiers. To make the comparison between the two systems, Mr. Tysoe adds 0·7d. for wear and tear of tools for hand work. In this item, is anything allowed for wear and tear and interest on the cost of the trolleys? This should certainly be done for strict comparison.

I would point out that, although it is quite right that the difference in maintenance and repair and interest on the cost of machinery should be charged against any saving of labour effected by the machines over hand labour, it is necessary that great care should be taken to see that these items are not included when comparing the cost of carbonizing by machinery in horizontal retorts and that of carbonizing by machinery in inclined retorts, without the actual charges are ascertainable for both systems. The last statement by Mr. Tysoe is very instructive, and shows that the saving by the use of stoking machinery ranges from 12·6d. to 14·2d. per ton of coal carbonized, compared with 34d. for hand labour; and inasmuch as 107,000 tons of coal have been carbonized during the half year by machinery, the saving by its use during that short period amounts to nearly £6000, which figure speaks for itself.

I must heartily congratulate the South Metropolitan Gas Company and Mr. Tysoe upon these excellent results, and thank him for calling attention to my figures. The information he has now given will be valuable to the gas industry generally; and it certainly confirms me in the view I have always held—that every item for wages, repair and maintenance, and interest should be embodied in the results of working all systems, before one can make accurate comparisons between them. My idea in devoting a portion of my address to this subject was to throw as much light as possible upon it; and I explained that I found very considerable difficulty in getting complete information, as some engineers and managers of works charge the taking of the coal from the stores to the retort-house to the coal account, and others the removal of the coke to the coke account, and when speaking of retort-house wages give figures relating to the stokers and firemen only.

I am glad to find that there is a practical agreement, by those most competent to give information, as to the saving of power stoking machinery for large works. The cost of working manual machinery in medium and small works, I gave from my own experience, supplemented by the reliable evidence of other engineers working the system.

Although the saving of carbonizing wages is a most important matter, there are other considerations to be taken into account in making comparisons between the various systems of carbonization now in use—such as the reduction of the arduous work of the stoker, the make of gas per ton, and the illuminating power of the gas made.

It would be very useful and interesting if others would follow the good example set by Mr. Tysoe for the benefit of the industry, and give the full and complete cost of carbonizing, inclusive of all charges, between the old and new systems of hand labour and working by machinery, with either horizontal or inclined retorts.

JOHN T. LEWIS.

Wellingborough, March 10, 1898.

The Collection of Gas Accounts.

SIR,—As no one of your many readers other than Mr. Brearley and myself has thought fit to contribute towards a solution of the collection difficulties, discussed in the "JOURNAL" at the end of last year, permit me to add a few words in closing.

Generally speaking, this is the season of the year when the heaviest quarter's collection is nearing completion, and the time when the greatest difficulty is experienced with "bad pays." Any system capable of dealing effectually with the question at this season, is therefore worthy of notice; and it may be interesting to some to learn that the plan described in my letter of Dec. 8, 1897, is giving greater satisfaction than ever. As showing how the consumers are gradually becoming accustomed to it, last March over 300 notices of all kinds (Nos. 1, 2, and 3) were sent out; while this time only 102, all told, were required. The collections—commencing on the 1st of January each time—were completed by the 7th inst. this year, against the 12th of March last year. Also the arrears on the December quarter's accounts on completing the collection this time are actually *nil*, as compared with 13s. 5d. last March. The collection of the heaviest quarter's accounts of the year was thus made and completed in 55 working days, and only in one case was the "cut-off" resorted to; legal proceedings, by the way, being quite uncalled for.

It may interest Mr. Brearley to know that, despite the intelligence of the average schoolboy, the chairman of an important gas-works undertaking in Yorkshire, which had adopted the discount system, felt constrained, at a shareholders' meeting recently held, to reply to certain critics who would persist, when comparing the price of gas with that of other illuminants, in basing their comparison upon the gross instead of the net price of gas. Such is human nature—perverse if you like; but we must perforce take it as we find it.

As to the absence of dunning under the discount system, this is more imaginary than real, as, even at Longwood, legal proceedings are instituted at times; and it is much akin to adding insult to injury when, after losing his discount through exceeding the time allowance, the consumer is pressed just as severely as under the collector system. Is it not also a fallacy to imagine that collection is effected under the discount system without cost? Gas bills, like other accounts, must be distributed, which means one call round or its equivalent in cost; and the clerk or clerks who receive payment at the office require some remuneration. But of greater importance still is the disadvantage of losing touch with the consumers, until the gas undertaking is viewed more in the light of a cumbersome machine than a personality; for no one can deny that a good collector is an excellent agent and intermediary.

It is somewhat anomalous, not to say contradictory, that the prepayment system, involving calls at short intervals, and the discount system, in some instances avoiding calls altogether, should exist side by side in the same street, town, or district. I suspect the discount system has been adopted in many instances with a view to avoiding legitimate trouble; whereas, had the means already to hand been properly employed, the prime cause of dissatisfaction would have speedily vanished.

I am sorry that more could not see their way to assist in the elucidation of this problem; but possibly the subject may be heard of again in a different form. However, I have reason to think that my humble contributions have been instrumental in inciting many to strive for better results under both systems; and I feel, therefore, that my effort has not been entirely in vain.

R. G. SHADBOLT.

Grantham, March 12, 1898.

Gas Testing in London.

SIR,—In September of last year the Gas Referees issued their usual "Notification" for the ensuing six months; and in a special paragraph they announced that "extensive changes would shortly be made in the mode of testing." After thirty years' experience of the *modus operandi* of these gentlemen, I must confess that I tried to swallow this statement with more than the usual grain of salt; but now it appears that my habitual scepticism has for once seriously misled me, as in the last issue of the "JOURNAL" these "extensive changes" are duly set forth for the edification and enlightenment of gas companies and gas consumers.

As you, Sir, naïvely remark in your comment, "the gas industry has been expecting an alteration of another kind." We must, however, be thankful for small mercies from Victoria Street; and probably the "crowning mercy" of a new standard of light will reach us in about another quarter of a century, if we can exercise the virtue of patience for that short period.

The question of the methods to be observed in testing for sulphur is of small consequence to producers or consumers of gas. Indeed, to put it broadly, it matters not whether the gas contains 15 or 30 grains in the 100 cubic feet. The whole original fuss respecting sulphur compounds was brought about by the late Medical Officer to the City; and it was perpetuated by the Gas Referees for reasons perfectly well known. This wretched craze for extreme sulphur purification has led to the useless expenditure of hundreds of thousands of pounds of public money, without one pennyworth of benefit to those who paid it; and worst of all the prescribing of the quantity allowed to be present, was left in the hands of those utterly without the necessary experience to deal with the subject.

At the outset, the Act of Parliament was complied with by making one of the Referees "skilled in the manufacture of gas." Since, however, the late Mr. F. J. Evans ceased to be a Referee, this salutary rule has not been complied with, unless the gentleman last appointed is the "skilled" one. Of this, I am not certain.

As you have remarked, some of us did expect something more extensive in the way of change than some slight tinkering of the time during which the sulphur apparatus should run. Indeed, it looks something like a "red herring" drawn along the path, to divert attention from the much more important matter of a new standard of light, to supersede the candles (if they are to be superseded).

It is about time that this matter was settled one way or the other. For a third of a century the Referees have presumably been working at it. Two Committees have sat and reported; and now we are as far off as ever from any result. The Standards of Light Committee was the most important, and should have been appointed and paid for by the Board of Trade, and its recommendations treated with some respect. Instead of this, its conclusions were, to say the least, anything but satisfactory.

If in place of this Committee, a third of the amount spent (£500) had been publicly offered as a prize, the whole problem would have been solved long ere this.

It is clear that, if we have to wait for the Gas Referees to find us a satisfactory standard of light, we shall have to be without one for at least another generation—perhaps two.

J. VINCENT TAYLOR.

March 12, 1898.

Retort-House Improvements at West Bromwich.—The Gas Committee of the West Bromwich Corporation have had under consideration a report from the Manager (Mr. T. Glover) with reference to the existing capabilities of the carbonizing plant; and, in lieu of making large extensions during the next two or three years, they have resolved to have two of the retort-settings reconstructed for gaseous firing, at an estimated cost of £200. These settings are at present not in use; and it is expected that, when renewed, they will increase the manufacturing capacity of the retort-house to an extent sufficient to meet the increased demand for gas during the next two or three years. They have also considered a report from Mr. Glover advising an alteration in the system of firing, and the substitution of coal slack for coke as a fuel; and they have resolved to carry out the suggestion at an estimated cost of £500. It is expected that the economies resulting from the change will pay for the cost of alterations in the course of three or four years. The Committee's recommendations have been adopted by the Town Council.

Foleshill and the Coventry Corporation Gas Bill.—By the provisions of the Bill which the Coventry Corporation are promoting in Parliament, power is sought to purchase lands at Foleshill for the construction of new gas-works. The proposal has provoked much discussion in the district; and the Local Authority recently gave notice of their intention to oppose the Bill—one of the grounds for this course being that, if the works were erected in the district, they would expect a reduction in the price of gas from 2s. 10d. to 2s. 4d. per 1000 cubic feet, which latter is the price paid by the consumers in Coventry. A meeting of the Foleshill ratepayers was convened for yesterday week for the purpose of consenting to the opposition by the Council; but the Chairman (Mr. W. H. Hanson) announced that he had received a telegram from the District Council's agents to the effect that the Corporation had conceded the 6d. reduction in price. The meeting received this notice with satisfaction, and passed a resolution that the expenses incurred in connection with the opposition should be charged as a special rate on Foleshill.

Gas-Works Profits at Smethwick.—At the meeting of the Smethwick District Council last Tuesday, the Gas Committee submitted the annual statement of accounts, showing a net profit for the year of £3037, which, with the balance of £1575 from the previous year, gave a disposable balance of £4612. Mr. Stone, in moving the adoption of the report, said while they had made more gas by 10 per cent., the profits were about the same as last year. This was accounted for by their having to pay 9d. per ton more for coal and through the residuals having gone down very much in value. The manufacturers thought they ought to have a lower price for gas used for motive power; and he hoped the Committee would be able to recommend this. With regard to the gas-works, they should have a reserve of retort power of 20 per cent.; and this was a matter the Committee would have to take into consideration. The district rate would receive £2000 from them; and as they handed over £1200 last year, he thought this was satisfactory. The Chairman (Mr. S. Smith) asked if it was wise to extend the works in view of the proposed introduction of the electric light. Mr. Stone replied that the Committee had nothing to fear from the electric light. The report was approved.

New Joint Stock Companies.—The Gas and Electric Light Consumers' Protection Association has been registered with a capital of £1000, in £1 shares, to establish and carry on a system of periodically inspecting the registering index of gas and electric light meters. The Era Incandescent Oil-Lamp Company, Limited, has been formed with a capital of £60,000, in £1 shares, to acquire the patents, patent rights, &c., granted to Messrs. A. & M. Graetz and the Incandescent Gas-Light Company, Limited, relating to incandescent oil-lamps. Under the title of Gavin Paul and Sons, Limited, a Company has been registered with a capital of £65,000, in £10 shares (of which 3000 are 5 per cent. preference), to acquire the collieries, mineral leases, and mining plant of Mosside, Wester Inch, Whitehill, Standhill, Riddochhill, Boghead, and others, near Bathgate, at present carried on by Gavin Paul and Sons, coalmasters, of Edinburgh and Bathgate, or some of them, and to carry on and develop the same. The Daylight Incandescent Mantle Company, Limited, has been registered with a capital of £100,000, in £1 shares, to acquire "all or any of the patent rights, patents, and privileges in respect of an invention relating to gas mantles and other burners," granted in the United Kingdom, France, Belgium, Italy, and Australia; and to carry into effect an agreement made between the Company and Gerhard (otherwise Budo) Puchmüller, of Schoeneberg, Germany. The Manchester Acetylene Gas and Carbide Company, Limited, has been registered, with a capital of £40,000, in £10 shares, to acquire and carry on the business of gas engineers, makers of gas-plant, and dealers in chemicals, carried on in Salford as the Manchester Acetylene Gas and Carbide Company. The Martock and District Gas Consumers' Company, Limited, has been formed with a capital of £10,000, in 600 preference shares of £5 and 7000 ordinary shares of £1, to take over the business of a gas manufacturer and coke merchant carried on by Mr. W. A. Padfield at South Petherton, Somerset, as the South Petherton Gas-Works, and to enter into a certain agreement. The Directors are to be elected by the subscribers.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Thursday, March 10.

ELECTRICAL ENERGY (GENERATING STATIONS AND SUPPLY).

The Earl of Morley moved—"That it is desirable that a Select Committee be appointed to join with a Committee of the House of Commons to consider and report: 1. Whether, notwithstanding the provisions of section 12 (1) of the Electric Lighting Act, 1882, powers should be given in any cases for acquiring land compulsorily for generating stations; and, if so, under what conditions as respects liability for nuisance, notices to surrounding owners, and otherwise. 2. Whether compulsory powers of acquiring land for generating stations, if proper to be given in any case, should be given where the proposed site is not within the area of supply. 3. Whether, in case of a generating station, however acquired, not being situate within the area of supply, power should be given for the breaking up of streets between the generating station and the boundary of the area of supply. 4. Whether powers should be given in any case for the supply of electrical energy over an area including districts of numerous local authorities, involving plant of exceptional dimensions and high voltage; and, if such powers may properly be given, whether any; and what, conditions should be imposed with respect to system and plant, and to the construction and location of generating stations, in view of the powers of purchase conferred upon local authorities by sections 2 and 3 of the Electric Lighting Act, 1888, and with respect to the relations of the promoters to other undertakers and to local authorities within parts of the area. 5. Under what conditions (if any) ought powers to be conferred upon promoters seeking to supply electrical energy to other undertakers and not directly to consumers."

The motion was agreed to.

The opposition to the Folkestone Gas Bill and the Market Harborough Gas Bill has been withdrawn.

The Aberystwith Gas Bill, the Redhill and Reigate Gas Bill, the Swansea Gas Bill, the Yeovil Corporation Bill, and the Yeovil Gas Bill have been referred to a Select Committee, consisting of the Earl of Lauderdale (Chairman), Duke of Bedford, Earl of Dartrey, Viscount Bangor, and Lord Seaton; to meet on Wednesday, March 16.

The Morley Corporation Gas Bill and the Morley Gas Bill have been referred to a Select Committee, consisting of Lord Rookwood (Chairman), the Earl of Verulam, Lord Carnwarth, Lord Wandsworth, and Lord Dunalley; to meet on Thursday, March 17.

Petitions have been presented against the Forres Water Bill and the Newcastle and Gateshead Water Bill.

HOUSE OF COMMONS.

Tuesday, March 8.

SOUTHWARK AND VAUXHALL WATER BILL.

On the order for the second reading of this Bill,

Mr. Stuart asked the hon. member for the Uxbridge Division (Sir F. Dixon-Hartland) if he intended to bring forward the motion for the rejection of the Bill which appeared on the paper.

Sir F. Dixon-Hartland said he did not; but at a subsequent date he proposed to move an instruction to the Committee with reference to the flow of water at Penton Hook Weir.

Mr. Stuart said neither did he propose to move the rejection of the Bill; but he could not allow it to pass this stage without calling the attention of the House to one or two points. The Bill was introduced in virtue of a clause in the Act of last session, which practically pledged the Company to introduce some Bill or other this year. He entirely disapproved of the Bill; and he reserved to himself the right of opposing it on certain general points when it came from the Committee. On the present occasion he submitted to the House that the giving of permanent powers to the Company would really be in contravention of the spirit, at any rate, of the circumstances under which the Bill of last year was passed, and that the time had not come for conferring such permanent powers. Taken in conjunction with the Staines Reservoirs Scheme, the effect of the Bill would be to practically denude the Thames of water. Then, again, the scheme of the Bill was incompatible with that laid down by the Royal Commission presided over by Lord Balfour. If it were found necessary, pending the settlement of the whole water question for the Metropolis, that the Company should be granted further powers of a permanent kind, then, in his judgment, there ought to be included in the Bill a form of purchase clause whereby some authority should be empowered to purchase the undertaking on behalf of the public.

Sir F. Dixon-Hartland said the policy of the London County Council was that the water for London should be brought from somewhere else than the Thames. The Thames Conservancy were clear upon this point—that there was enough water in the Thames for the whole population of London for the next 100 years, if it were only taken in the right way. The supply of water for navigation was what they considered of the greatest importance; and if the Conservators got that, they thought the Water Companies ought to have the water if they only took it in a proper manner.

Mr. Buxton desired to enter a protest against the Water Companies being granted permanent powers, which would distinctly prejudice the position of the Royal Commission and of the Government.

Mr. Stuart-Wortley said the promoters of the Bill were prepared, at the proper time, to prove that their scheme would not only not denude the Thames, but that it fully carried out the statutory obligations expressly laid upon the Company, and all private undertakings placed upon it.

The Bill was then read a second time.

Thursday, March 10.

THE GASLIGHT AND COKE COMPANY'S BILL.

On the order for the second reading of this Bill,

Mr. Pickersgill, in moving "That the Bill be read a second time this day six months," said the object of the measure was to consolidate and convert the capital of The Gaslight and Coke Company; and if it had only proposed the unification of the existing stock, he should have regarded it as a purely domestic matter affecting shareholders only, and not one of great public concern. What he objected to was the proposal for watering the stock; and he would state the grounds of his objection. In the first place, the House would see that this was not a small measure; but one which dealt with enormous interests. The stocks which it was proposed to convert amounted to close upon £12,000,000 sterling, nominal value; but it would be convenient if he confined himself to the ordinary stock of the Company, which amounted to upwards of £6,000,000. It would not be necessary to go further back in the history of the undertaking than the Act of 1876, in which a parliamentary bargain was made between the Company and the consumers, and the relation between the dividend which might be paid and the price to be charged for gas was regulated by what was known as the sliding-scale. Taking 10 per cent., the dividend then payable on the ordinary stock, as the standard dividend, and the then rate of 3s. 9d. per 1000 cubic feet as the standard price of gas, it was stipulated that for every penny charged below or in excess of that price the rate of dividend for the year would be increased or diminished by one-quarter per cent. Further, by the Act the interest of the public was protected by the auction clauses, under which stock was thereafter to be submitted to auction, and the premiums thereon were not to go to the shareholders, but be employed for the purposes of the undertaking, and in this way indirectly for the benefit of the consumers. The principle of the auction clauses was to support and strengthen the sliding-scale clause; and the joint effect was to provide that the shareholders should not for 1876 and onwards receive any additional advantage without some corresponding advantage accruing to consumers. Under the Act of 1876, therefore, both shareholders and consumers had some benefit. The price of gas was now 2s. 10d. per 1000 cubic feet, and the dividend 12¾ per cent. on the ordinary stock. But the Company were not content. They said that £100 worth of stock nominally, with a dividend of 12¾ per cent., the value of which ran up on the Stock Exchange to something between £200 and £300, was not so simple as £100 at 4 per cent., commanding a premium of perhaps £18 or £20. So the Company brought forward the present Bill, by which they asked the House to allow them to convert their ordinary stock, with a standard rate of dividend of 10 per cent., into stock 2½ times greater, but bearing a standard dividend of only 4 per cent. This conversion would confer great advantage on the Company; but its effect on the community would be very mischievous. In the first place, the result would be to conceal from the eyes of the public the real facts in relation to the Company. They were now paying 12¾ per cent. on their ordinary stock; but if the Bill passed, they would apparently be paying only 5 per cent. It was contrary to public policy that a Company dealing under statutory powers with a monopoly should seem to pay only 5 per cent. when in fact they paid a dividend of 12¾ per cent. His second objection was that it was proposed by the Bill to rip up a parliamentary bargain made in 1876 between the Company and the gas consumers of London, and to do this entirely in the interest of the Company. It made a present to the shareholders in the shape of an enormous enhancement of the Stock Exchange value of the undertaking; whereas nothing in the nature of a *quid pro quo* was given to consumers. He understood, from an interview he had just had, that it would be said there would be some advantage to the consumers, who would receive compensation through the operation of the auction clauses on that portion of the authorized capital of the undertaking which as yet remained unissued. But in order to knock the bottom out of that argument it was sufficient to merely state the amount of the unissued capital. The total stock was nearly £12,000,000; and the amount remaining unissued was £175,000—a mere bagatelle. It was obvious that, while the Company would receive an enormous advantage, the benefit to the consumer through the £175,000 of unissued capital would be absolutely inappreciable. In the third place he objected to the Bill because the community would be prejudiced by its effect if at any future time a public authority proposed to acquire the property of the Company. It was admitted that the Bill would increase the Stock Exchange value of the undertaking. The degree of enhancement would, of course, be a matter of dispute—indeed, it was obvious that the precise extent could not be forecast. But nobody could deny that it must be considerable, and might be enormous. The House was not without the guide of a precedent in the case of the South Metropolitan Company, whose stock was treated in a similar manner in 1896, under circumstances to which he would presently refer. The Chairman of that Company estimated the probable increase at £90,000; whereas the estimate of the London County Council was £250,000. Both were wrong; for, as a fact, the enhancement in value proved to be £900,000. He believed it would be argued that the enhancement of the Stock Exchange value of an undertaking would not affect the price to be paid in the event of purchase by the public. He anticipated this argument. It would be assumed that the arbitrator would estimate the price, not on Stock Exchange value, but on the revenue. He would leave this argument to be judged by the candour and common sense of the House. It would be difficult to persuade hon. members that the market value would not be a possible basis on which the Company would come before the arbitrator. An arbitrator did not give his reasons, and it was not always possible to understand or know what motives or opinions were at the back of his award; and he (Mr. Pickersgill) did say there was a risk—not to put it higher—a serious risk, which he thought no man would willingly incur in the case of his own private concerns, that Stock Exchange value would have no inconsiderable influence in the determination of the final price. With regard to the precedents upon which he believed reliance was placed, it was alleged that there were four or five in favour of the course the promoters desired to take. But these, with one exception, were all agreed Bills—that was to say, the local authorities entitled to oppose considered that in some shape or other they had received a *quid pro quo;* and the one exception was that of the South Metropolitan Gas Company. That Bill had a very significant history. As originally introduced in 1895, it was referred to a Select Committee, who disapproved of the proposal, and made the following report: "Your Committee consider that the subject of conversion of stocks is of so far-reaching and important a character that it ought to be dealt with by a Committee specially appointed to consider the same as affecting gas and water companies." The Chairman of the Committee sat on the other side of the House, the hon. member for the Knutsford Division (the Hon. A. de Tatton Egerton). The Bill was not proceeded with, but was re-introduced in 1896, referred to

another Committee, and passed. It would perhaps be worth while to mention that there were provisions in it which seemed to have influenced certain members of the London County Council, and possibly might have biassed some members of the Committee. But he was on firm ground when he said that the House was no more precluded from a decision by the opinion of the one Committee than of the other. It was clear that this was not a question which could be determined by taking a quantity of evidence, but distinctly one of policy. If the present Bill could be referred to two different Committees, probably they would arrive at opposite conclusions. It was an issue the House ought to decide on its merits. What was the feeling of the Local Authorities whose duty it was to represent the public in these matters? The London County Council, the Holborn District Board of Works, the Islington Vestry (one of the largest in London), and other Local Authorities, had passed resolutions hostile to the Bill—that of the London County Council being particularly significant. This was not in any way treated as a party question, for leading members of the Moderate party denounced the Bill in language even more vigorous than that used by the Progressives. As a matter of fact, the Council were practically unanimous; those voting for the resolution against the Bill being 101, while only 4 were in favour of it, of whom 2 were tellers. Substantially, then, there was a unanimous feeling against the Bill. Lastly, he contended that this was not a time when the Company were entitled to come to the House and ask for any indulgence. They had just given notice of an intention to raise the price of gas from 2s. 10d. to 3s. per 1000 cubic feet; and it was freely stated by the Local Authorities to whom he had referred that this state of things was due to bad management and over-capitalization. It might be said that this rise in the price of gas would not, under the sliding-scale, benefit the shareholders of the Company. No doubt the effect of this increase of 2d. would necessitate a reduction of the dividend by ¼ per cent. But no doubt one object of the Company was to prevent a heavier fall; for unless they were able, by putting their hands into the pockets of the consumers, to prevent it, the fall in the dividend on the ordinary stock would be very much more. He had endeavoured to put the case fairly; and he asked the House to reject the Bill this year. There was no urgency in the matter; it was at the best only financial jugglery. Let the House throw out the Bill now, leaving the Company free to approach the representative Authorities of London, so that new arrangements might, if necessary, be made in a form equitable to both parties to the bargain made in 1876.

Mr. J. Dillon formally seconded the motion.

Mr. Banbury said the hon. member had founded his reasons for the rejection of the Bill on the assertion that the consumers would not derive any benefit, and that a public authority would lose should the Bill become law. The Stock Exchange value of the undertaking would, he said, be increased. This, no doubt, was true; but he (Mr. Banbury) hoped to be able to show that there would be equal benefit to consumers as to the Company; and he did not think it could be held to affect the price a possible purchasing authority might have to pay for the undertaking. He did not think any water or gas company had been bought on the capital value of the concern; and it would be a very unfortunate thing if this were introduced instead of revenue as a basis for purchase. There would be nothing to prevent a body of persons combining for the purpose of enhancing the value of a concern upon the Stock Exchange; whereas it would be very difficult to enter into a combination to enhance the dividend. The hon. member did not object to the Bill as a measure for the consolidation of the preference and debenture stocks; it was only because the ordinary stock was to be altered that he objected. But if his objection was confined to one clause, why not let the Bill go forward to a Committee? He himself objected to one clause—the 13th—which would allow trustees to invest in the stock. This was an important clause; and, in his opinion, it ought not to be allowed. Still he would not oppose the Bill because of it. The hon. member had referred to "watering" the stock. Now, the stock was to be increased, but the dividend was to be diminished; and this was not a case of "watering" the stock. The shareholders would gain nothing beyond the increase of value on the Stock Exchange; but the consumers would gain in this way—that, if it should be necessary in future to raise capital, the Company could raise it on better terms if the Bill were passed than otherwise.

Mr. Pickersgill remarked that the amount of unissued capital was only £175,000.

Mr. Banbury acknowledged that this was so; but he said there was nothing to prevent the Company applying for power to raise more capital. Every large railway company had come to Parliament and consolidated their stock; for they found that the market was better, and that they could borrow on more favourable terms. The same thing applied to ordinary stock; and as here shareholders and consumers were practically partners, anything which tended to benefit the former must tend to the advantage of the latter. The hon. member had alluded to the objection of the London County Council. But there was reason to believe that the opposition there arose from the Bill not being properly understood. As a matter of fact, though the Bill presented a somewhat alarming appearance, there was little in it, and it would not hurt the consumers. He therefore hoped the House would allow it to go before a Committee.

Mr. Kimber said the arguments used by the hon. member on the other side (Mr. Pickersgill) had been heard in the House and by Select Committees not only four or five times, but ten times at least in the presence of representatives of ten of the largest towns, including London; and as they had been debated and settled, to bring them forward again was mere reiteration with which it was not profitable to occupy the time of the House. The South Metropolitan Gas Company's Bill of two years ago had been referred to; and it was very properly argued, with respect to that Bill, by a very distinguished Counsel—Mr. Worsley Taylor—that, if the Committee passed it, it would become a precedent for all gas companies to follow. The Committee passed the Bill; and the House endorsed the action of its Committee. He submitted, therefore, that though it was not, as the hon. member had said, an agreed Bill, it was a thing adjudicated upon after argument. The hon. member was inaccurate—not, he was sure, intentionally—when he said every £100 of ordinary stock carried a standard dividend of 10 per cent., the rate to rise as the price of gas went down; and that this was to be "watered down" to 4 per cent. He alluded to this as "financial jugglery" to raise the price of stock on the market. But this could not be so, seeing that at present the price was £280, or at least more than the so-called "jugglery" was supposed to effect. Then the hon. member said that people would be mystified—that the real value would be concealed; and that hereafter, when a public authority came to buy, they would, in consequence, have so much more to pay. Even supposing this were so, he did not see that it was an argument against the Bill. Revision of stock, accompanied by unification, was the important point of the measure. It was a simplification; and people would understand it better. But supposing, instead of the market price being £280, it became £300, and a public authority wished to buy the undertaking, it would naturally not value it on the estimate that somebody on the Stock Exchange put upon it (for that price might be decided by a "corner" or combination), but by the intrinsic value of the concern. They would look to the returns per annum on the amount of money invested. The hon. member said the Company had chosen a very bad time for making their proposal, when they were putting up the price of gas. But, under the sliding-scale, when the price went up, down went the dividend. He hoped the Bill would be allowed to pass its second reading.

Mr. Buxton said he had listened carefully to the speeches of the supporters of the Bill, and did not think they had made out a sufficient case for sending it to a Committee. It seemed to him that interference with a parliamentary bargain between the monopoly-holder and the gas consumer should not be allowed without strong reasons. His hon. friend who spoke first said it was his opinion that the price of the stock might be increased if the Bill were passed. His hon. friend who had spoken last cast considerable doubt on the question whether the intrinsic value of the stock would be increased in that event. This seemed to be the only argument advanced in favour of the Bill; and he thought the House ought to hesitate before reading it a second time. What was the possible benefit that was to accrue to the consumer? He did not see how the consumer was to be advantaged in the remotest degree by the Bill. It has been said that, if the Bill passed, it would increase the value of the stock, and that therefore if the Company wanted to raise further capital, they would be able to obtain it at a lower rate. They had already spent something like £12,000,000, and their unexpended balance was only a small matter of £175,000. He did not think this could be said to be of any practical benefit to the consumer. He felt bound to oppose the Bill, on the ground that when they had a Company such as this, representing practically a monopoly in various parts of London, and when the Company obtained powers of an exceptional character, and, from the enormous benefits received, were able to pay the large dividend of 12¾ per cent., with gas at a certain price, he thought the House ought not to allow a bargain of the description which had been described to be departed from merely in order to increase the market value of the Company's stock. With regard to the question of purchase, he did not particularly dwell upon that, because he did not think a public authority would at any time be likely, in such circumstances as the spread of the electric light, to purchase the undertaking of the Company. The hon. gentleman who spoke last said they ought to allow the Bill to go through because other Gas Companies had been enabled to carry out the same proposal. He thought a conclusive answer had been given to this contention—namely, that in all other cases it had been by agreement between the Company and the Local Authority, and that in every such case there had been some *quid pro quo* given to the consumer. It was because the consumer obtained no benefit, and the Local Authorities had not been consulted, that he opposed the Bill.

Mr. H. Marks desired, before the House came to a decision, to have three points borne in mind. The first was that the Bill was fully discussed by the late County Council—a body at that time consisting half of Progressives and half of Moderates, and only two members of the Moderate party were found in favour of the measure, while 100 out of 120 members were vigorously opposed to it. The second point was that no explanation had been given of the action of the Company in raising the price of gas. The House had been left to form its own judgment as to the objects of this movement, and as to whether any consideration had been given to the necessity of providing hereafter for the equalization of the dividends on the stock. His third point was that this would be a very mischievous precedent to set, and one which might be established in the case of every Company supplying gas or water, or other commodities, to the people of London. The mere fact that the promoters had not given any explanation as to the raising of the price of gas would of itself prevail with him in opposing the second reading of the Bill.

Sir J. Joicey said the reason given by his hon. friend for opposing the Bill was the very one which induced him (Sir J. Joicey) to support it. This was practically nothing but a Bill for the consolidation of capital; and the principle had been applied, not once, in that House, but dozens of times, in connection with large railways, and more recently in the case of the South Metropolitan Gas Company. He thought, therefore, that to withhold the privilege from this Company would be most unwise. Allusions had been made to the advance in the price of gas. But the sliding-scale which had been referred to, had been of immense value to the consumers. He could quite understand the consumers finding fault when the price went up; and so long as they did not produce, they were all glad to see the price as low as possible. But the producers of coal in the North of England would rather like to see the price of coal higher rather than lower in this portion of the country; and, on the part of his constituency, he had to say that they should like to have a much higher price of coal, even if it should be at the expense of the consumers of gas in the City of London. With regard to the advantage that came to the consumer by this Bill, he was bound to admit that it was only trifling. But it was a trifling advantage that the Company themselves obtained. It must be understood that every penny of capital which had been raised by the Company for many years past had been raised under the auction clauses—that was to say, if the Company wanted to raise £10,000, it was put into the auction-room and commanded the full market price. The result was that when hon. members said that the Company were getting something like 12¾ per cent. dividend, they forgot that, as a matter of fact, they were only getting this dividend on one-third of their capital, because while they only paid 12¾ per cent. on £100 of stock, every purchaser had for many years past had to pay £250 or £300 for each £100 worth. The result was that of this money £150 or £100 practically received no dividend whatever; and he thought it would be of advantage, not only to the Company but to the consumer, to have the capital consolidated in this case as it had been done in many others. On these grounds, he should support the second reading of the Bill.

Mr. W. Woodall observed that the House could hardly have followed the arguments addressed to it from both sides without feeling that there were many points involved which ought to be, and which could only justly be, considered by a Committee. It would be impossible for hon. members to comprehend the operation of the sliding-scale or the effect of the auction clauses. He hoped, therefore, that the Bill would be referred to a Committee who would thoroughly consider it.

Sir J. Blundell Maple desired to explain, in answer to Mr. Marks, that the reason the London County Council agreed to oppose the Bill was, in effect, that they could not support it, because it contained clauses with which they could not agree. (Laughter.) When an authority supported a Bill, they had to do so in all its clauses; and this was the reason, and not because they disagreed with the principle of the conversion of stock, that the Council opposed. He agreed that the Bill ought to be dealt with by a Committee. He was one of those who believed in the shares in big companies being as small as possible, so that they might be dealt with by small people, and not kept in large blocks as they were now.

Mr. Lough was sorry the right hon. gentleman the member for Hanley (Mr. Woodall) had not imitated the reticence observed by the Government bench, and left the matter to the decision of the House. He thought the right hon. gentleman was the more ill-advised in his action, because the speech delivered by the hon. baronet the member for Chester-le-Street (Sir J. Joicey) should have put him on his guard. That hon. gentleman "let the cat out of the bag," and revealed to them that the Bill was a sort of conspiracy between the producers of coal and the sellers of gas. The hon. member for St. George's-in-the-East (Mr. Marks) had suggested that the Company had not given any reason for the rise in the price of gas. He was sure the House would not accept as a reason that it was purely a question of a sliding-scale, and that when the price went up the dividends went down. The answer to that was that the price to the consumer did not go down so much as the profit to the seller went up. The Company had given a most inadequate explanation of their imposition. These Private Bills were not brought forward to be treated by the House as a Committee of the Stock Exchange would treat them. Generally they were introduced by companies who wanted to do some work, and not to water their stock or to commit some financial jobbery. Considering the unpopularity of the Company at the present time, owing to the increase of their price, it would be injudicious for the House to pass the second reading of the Bill; and he hoped it would not do so.

The House divided, with the following result:—

For the second reading	171
Against	89
Majority for	82

The Bill was then read a second time.

The following further progress has been made with Bills:—

Bills read a second time and committed: Plymouth and Stonehouse Gas Bill, Southend Water Bill, Wigan Corporation Bill.

The Standing Orders Committee reported that, in the case of the Filey Water and Gas Bill (Lords), the Standing Orders ought to be dispensed with, and that the parties should be permitted to proceed with their Bill, on condition that they strike out of the limits of the Bill all parts of the parishes of Hunmanby, Muston, and Filey, and the townships of Gristhorpe and Lebberston outside the district of Filey, which were not defined in the notices for the Bill, and also the charge in clause 22 on houses of which the rateable value amounts to £5 but does not exceed £10.

Adoption of the Prepayment Meter-System at Southport.—The Gas Committee of the Southport Corporation have only lately decided to introduce prepayment gas-meters. They have arranged to supply 24 cubic feet of gas for a penny in cases where the Corporation supply the fittings, and 26 cubic feet where the fittings are provided by the consumer. According to Mr. J. Dimond, the Chairman of the Gas Committee, they are making this departure in order to increase the consumption of gas, which has been somewhat reduced in consequence of a considerable number of large buildings having adopted the electric light.

Additional Plant for the Grantham Water Company.—The Grantham Water Company intend to largely increase the plant at their pumping-station, where the water is at present raised for the supply of the town by a Cornish beam-engine put down in 1873, working with a boiler pressure of 30 lbs. per square inch. New engine and boiler houses are to be built; and an order has recently been placed with the Hydraulic Engineering Company, Limited, of Chester, for the manufacture of a large duplex pumping-engine capable of lifting 1½ million gallons per 24 hours. It will be built to the requirements of Mr. H. Preston, the Engineer, and will be surface condensing; the valve-gear being arranged on the Blake and Knowles system, for the manufacture of whose specialities the Chester Company are sole licensees in this country and the colonies. A new boiler will be put down to work in connection with the engine at a pressure of 75 lbs. per square inch.

The Introduction of Gas Lighting into Sunderland.—Now that the question of electric lighting extension is engaging attention at Sunderland, it may (says the "Newcastle Chronicle") be of interest to recall the fact that it was just 74 years ago since the town first enjoyed the luxury of gas light. In a circular issued in August, 1823, a gentleman named West, who had completed the lighting of Stockton, Richmond, and other towns, and was at the time engaged in applying the new light to the city of Durham, announced that he had entered into a contract with the Commissioners under the Sunderland Improvement Act, for the purpose of lighting the lamps; and he next held out to the residents an opportunity of introducing "that most desirable light," as it was justly termed, into their houses and places of business. The result was the formation of a Company called the Sunderland Gaslight Company; among the first trustees being Messrs. Hepburn Thomson, John Miller, Thomas Mounsey, Thomas Robson, and Ralph Carr, all of whom have passed over to the "majority." Works and offices were erected on a piece of land in Russell Street; and, the necessary operations having been completed, the town was, for the first time, lighted with gas on March 9, 1824. The auspicious event appears to have been inaugurated without any public demonstration or festivity; the local chronicler satisfying himself and posterity with the simple announcement of the fact.

LEGAL INTELLIGENCE.

THE ASSESSMENT OF THE SOUTHAMPTON GAS-WORKS.

(*Before Mr.* E. U. Bullen, *Recorder of Southampton.*)

Thursday, March 10.

The appeal of the Southampton Gas Company against the assessment of their property by the Southampton Guardians came to-day before Mr. Bullen, as Arbitrator, at his chambers in London. The case was originally considered by him in his capacity of Recorder of Southampton (see *ante*, p. 537). But, as mentioned last week, the parties agreed to go to arbitration; and the proceedings were continued in this form.

Mr. Littler, Q.C., Mr. Ryde, and Mr. Lampard appeared for the Company; Mr. Balfour Browne, Q.C., and Mr. Barnes represented the Guardians.

Mr. *Smith*, the Secretary of the Company, was re-called, and, in answer to Mr. Littler, said he had had the whole of the costs of the various items in the schedules taken out by his clerks, under his personal supervision; and he guaranteed the accuracy of every figure. He had seen nearly everything in the inventory of tools, furniture, &c.; and they had been put at cost price.

Mr. Littler: You have taken off 20 per cent.?

Witness: I think that, considering we are frequently renewing articles, that is a liberal allowance to deduct for depreciation.

Mr. Balfour Browne said he asked on the first day's hearing to have the half-yearly accounts of the Company for June, 1897; and they had been promised him.

The Recorder: You require them for purposes of cross-examination?

Mr. Balfour Browne: Yes.

Mr. Littler said he would produce the accounts; but he contended that what happened in the middle of 1897 could in no way affect what occurred when the assessment was made, six months before. The assessment was based on the accounts for 1896.

The Recorder thought anything prior to September, 1897, could be used in evidence.

Mr. Littler reminded the Recorder that the June accounts were not in existence in September, 1897. They were not produced till the meeting in November. On a previous occasion, he handed the accounts to Mr. Balfour Browne's junior.

Mr. Balfour Browne said he did not have them.

After some further argument,

Mr. Littler complained that he had been insulted by Mr. Balfour Browne, and declined to go on with the case; but he ultimately agreed to do so. He asked the Recorder to take a note that he objected to anything with regard to June, 1897; and he further objected to it because in September, 1897, the document was not in existence.

In answer to Mr. Balfour Browne, witness said that the figures in the money column represented cost price; and in order to get at the present value, the Surveyor had deducted an all-round figure of 20 per cent. The gantry for unloading coal was treated as a tenant's utensil, as was also all the machinery in the smith's shop which was not fixed. Nothing of a fixed nature which belonged to the landlord was included in the list.

Mr. Balfour Browne proceeded to ask witness a question as to the increase of gas consumed in the half year ending June, 1897; but

Mr. Littler interposed, and asked whether on Sept. 17 the balance-sheet for June was published.

Witness replied that it was not published for more than a month after that date.

The Recorder said the figures must have been in existence.

Witness: Under the Act of Parliament, our shareholders' meetings are held in May and November; and the balance-sheet for June was not made up on Sept. 17. The accounts were audited about Oct. 25.

Mr. Balfour Browne: Is it a fact that the increased sale of gas for that half year was 17¾ million cubic feet?

Witness: Yes.

Did the amount realized for the residual products in that half year show a satisfactory increase?—It did.

Asked whether he was present at the half-yearly meeting of the Company in November, 1895, at which it was stated that the renewals and repairs had been abnormally heavy during the half year, witness replied that he was there; but he could not undertake to say that the Chairman made such a statement. He did not think the Chairman gave the cost of renewals as a reason that the dividend was not earned.

Re-examined by Mr. Littler: The half year ending Dec. 31 last would show a considerable reduction over the June half year; and the result was nothing like so good. The reduction would not entirely wipe out the increase in the first half of the year, but it would largely reduce it.

Mr. Littler: Is the June half of any value in forming a judgment of what the tenant would give for the whole year?

Witness: No.

Mr. *Marshall* was then re-called. He stated that he had gone through the inventory, and struck out anything he thought ought not to be included. The inventory included the steam-cranes on the viaduct, as they were tenant's chattels. Only the other day enormous hydraulic cranes fixed to the freehold in St. Katharine's Dock were held to belong to the tenants. The tenant could not unload vessels without the cranes. In the purifying-house, the Manager had put down £1200 for chattels; but witness struck out £933 for sieves. He did not think a tenant could do without the whole of the utensils mentioned in the inventory as of the value of £6042.

Mr. *Corbet Woodall*, M.Inst.C.E., in answer to Mr. Ryde, said he looked at the accounts of the Company; and he had ascertained that they had not been earning their statutory dividend for several years. In 1890, they just earned it; but in some years there was a substantial deficit. In 1896, the amount of profit earned was £15,926; the net receipts being 9·8d. per 1000 cubic feet; whereas the dividend required 11·6d. The difference was made up by going to the reserve fund. The 11·6d. required for the dividend was a comparatively low amount.

The Recorder: What is the average amount?

Witness: In London, it is 12·3d.; in Suburban Companies, 11·72d.

Mr. Ryde: You have made a valuation of the Company's whole undertaking?

Witness said he had, and he found that the whole of the receipts in 1896 were £55,319 after deducting bad debts. £21,971 had been paid for coal; but from this had to be deducted £12,730—realized by the sale of residuals. He took 6d. per 1000 cubic feet as a result of wide experience. This amount was necessary in order to keep the whole undertaking in proper repair.

You take one-third of it as tenant's maintenance?—I do. The tenant has to maintain all the tools and implements upon the place. He has all such expenses as the general cleaning up of the place, and keeping it in order; and it has to be borne in mind that this item includes all the items under the heads of salaries, wages, purifying, distribution, and management. The 6d. also includes the mains. On mains, there is a large amount of work a tenant would have to do. If there is a stoppage of supply, the tenant has to see to it. It often happens that lamps get out of order, and the syphons have to be pumped in the street. It would not be possible to get the work done by the Directors performed by a hypothetical person for less than £1000 a year.

In further examination, witness proceeded to put down the capital which a tenant of the works would require to have at £44,127. In arriving at this figure, he had allowed a stock of coal for eight weeks. They did not always have so much stock at Southampton. They had had more; but it was only for a short time, when they were fortunate. Eight weeks' stock of coal was not more than the Company should have. Risk of strikes at the collieries, difficulties on the way, possible strikes among seamen, and interruptions of that kind, made it necessary to have a good stock. The colliery owners had set their faces against storing coal at the pits; they said gas companies ought to take their supplies regularly, and store in summer what they required for winter use.

Mr. Ryde: Assuming the tenant has put £44,000 into the business, is there any reason why he should get a less rate of interest on one than on another part?

Witness said the idea seemed a fantastic one to him. It could not matter whether it was put in wages or lying at the bankers as security for his stability. He put the rateable value of the whole at £6433.

Mr. Balfour Browne, in cross-examination, informed witness that the case for the Guardians was that the five years taken by Mr. Marshall to find the average were abnormal ones. It worked out at 4s. 7d. per ton of coal carbonized.

Witness said it was 5½d. per 1000 cubic feet. He submitted that the five years was a fair average. The Company a year ago built a new retort-house, equal to those previously in use. The chief repairs of gas companies were in retort-houses; and in 1896, the Southampton Gas Company had no repairs of this kind.

Mr. Balfour Browne put several questions to witness based on "Field's Analysis;" and Mr. Woodall admitted that in 1891 what was averaged in Field at 3s. 6d. cost at Southampton 4s. 11d. It surprised witness that it varied so much; but if he had money to invest, he would put it in Southampton in preference to the other Provincial Companies referred to. As to the charge of £1250 for plans, witness said that a tenant would require to know the position of the mains.

Mr. Balfour Browne: Would not the large Ordnance map be all that you required?

Witness: No.

The Recorder said it startled him when he first saw the charge for the plans.

Witness: There are a very elaborate series of drawings, which involve an enormous amount of time.

The Recorder: Do you say the plans are worth it?

Witness: They are well worth it.

Mr. Littler in re-examination: Could any tenant carry on his works by simply having an Ordnance map showing that there were mains in the streets?

Witness: No; an Ordnance map is absolutely of no use to tell you where to find a main. I have spent many thousands of pounds in the preparation of such plans as these. If a tenant did not have them, he caused great inconvenience to the public and expense to himself.

Mr. *Smith*, re-called, stated that the Company had a principal map on the 40-inch scale, including four districts; one on the 30-inch scale, including five districts; and one on the same scale including six districts supplied by the Company.

The Recorder: When were these plans begun?

Witness: About 33 years ago.

And as you go on with your works, additions are made?—They are made in the office; and there are separate maps for depths and other matters. I should think we have thirty maps in all.

Mr. *Marshall*, re-called, said a tenant could not by any means do without the plans. The sum of £1250 included the whole of them. A tenant would require the current ledgers for 1895-96. There were six of them; and he did not think £100 would be an unreasonable price to pay. Then there were 20 meter-rental books for which another £100 should be given; and there was a tremendous quantity of stationery.

The Recorder: Are you going to charge for account books? Suppose you sold your business to a tenant, would you charge him for having kept these books?

Witness: I should expect something for the books. Then there is the plan of the works and the underground valves.

In cross-examination, witness said the New River Company's plans were put down at the value of £10,000. If a tenant said he did not want the books, the outgoing tenant could not sell them—they would not be worth anything.

Friday, March 11.

Mr. *A. L. Ryde*, of Messrs. Edward Ryde and Sons, valuers, in answer to Mr. Littler, said he had made a valuation of the Company's accounts. He adopted the plan of not at first introducing the residuals. He found the receipts to be £55,200; the coals and purifying materials, after deducting receipts for residuals, cost about £10,000; and the tenant's maintenance was one-third of £10,433. He had estimated for the repair of works, &c., at 5s. 6d. per ton of coal carbonized. £10,433 was a fair sum for repairs, insurance, and renewals. Tenant's maintenance would be one-third of £10,433; and the Company's accounts absolutely justified this sum. The average of other companies was of no use in arriving at the figure in the present case. The one-third was an arbitrary subdivision of what the tenant would have to do himself, and which could not possibly be relegated to the landlord.

Mr. Littler: Now we come to the occupier's share. You schedule the tenant's capital?

Witness: Yes. I do not think the tenant could get in enough money for five months to recoup the outgoings. If a tenant came in at Michaelmas, he would have to face the five biggest months. The meter figures were taken from the Company's list; when I had got the net cost from the books, I put down 25 per cent. for depreciation. That was ample, because the meters were kept up to a high state of efficiency.

You have allowed eight average weeks' supply of coal. In your view, is six weeks' sufficient?—I do not think it is for this Company. The beginning of the winter is the time when this stock should be in hand. At least one-half of the stores should be put down to the tenant.

With regard to the plans and books, are they required by the tenant or the landlord?—The tenant must have them; and the outgoing tenant would not let them go without getting something for them. In my view, a man coming in would be willing to pay for the plans. The tools and furniture, £8700, deducting 25 per cent., belonged to the tenant. The average life of mains was forty years. The landlord would have to look at the plans once in forty years; while the tenant would have to see them every day. The tenant's capital of £44,000 is the usual proportion—four-fifths of the receipts. There is no justification for putting 7½ per cent. on one part of the capital, 12 per cent. on another, and so on, because it does not matter whether the capital is locked up in wages, stock, or in the bank.

The Recorder: That seems to be common sense.

Witness said if 17½ per cent. was right for railways, he thought it ought to be the same for gas companies. The risk with gas companies was greater. So far as his experience went, the 17½ per cent. had been claimed and always allowed; it was a reasonable allowance for a gas company.

Cross-examined by Mr. Balfour Browne: Practically his figures followed the lines of Mr. Marshall's. He took the residuals out of receipts, and put them against the price of coals. In The Gaslight and Coke Company's case, he had taken six weeks as the stock of the coal; but the stock required by various companies differed.

Mr. Littler said that, with the exception of Mr. H. E. Jones, he had no more witnesses; but he asked the indulgence of the Recorder to interpose Mr. Jones before the case for the respondents closed.

The Recorder said he would permit this being done if the evidence was not to be rebutting evidence.

Mr. Balfour Browne said if that gentleman would merely confirm Mr. Ryde, Mr. Woodall, and Mr. Marshall it was not worth while. He would assume that Mr. Jones would say the same as the other witnesses. The learned Counsel then proceeded to open the case on behalf of the Southampton Guardians.

The remainder of the day was occupied with the speech of Counsel, and the hearing of evidence in support of the respondent's case. The proceedings closed on Saturday; Mr. Bullen taking time to consider his award. Our report will be concluded next week.

Cleveland Gas Company's Assessment Appeal.

At the adjourned special sessions at Guisborough last Tuesday, judgment was delivered in the appeal of the Cleveland Gas Company against the assessment of their works and mains in the parishes of Loftus, Kilton, Skelton, and Stanghow (*ante* p. 538.) The decision of the Court was that the rateable value of the property should be reduced from £429, the sum fixed by the Assessment Committee, to £396; but no order was made as to costs.

The Incandescent Gas-Light Company's Patents.

In the Chancery Division of the High Court of Justice on Saturday, Mr. Justice Romer had before him an action brought by the Incandescent Gas-Light Company, Limited, to restrain one Brogden from advertising and representing that the mantles which he sold were not, and had been held not to be, infringements of the plaintiffs' patents. By the statement of claim the plaintiffs alleged that they were the owners of patents, Nos. 15,286 of 1885 and 3592 of 1886; that they did a large business as manufacturers and dealers in incandescent mantles; that the defendant was a manufacturer of, and dealer in, incandescent mantles, and had represented in the "Shields Daily Gazette and Shipping Telegraph" that Brogden's incandescent gas-lights were undoubtedly displacing all others by their immense superiority, and had been legally decided not to be an infringement. No legal decision had been given that the mantles of the defendant were not constructed in infringement of the above-named patents. The plaintiffs had suffered considerable damage through having lost the sale of mantles which otherwise they would have sold. An injunction had been granted against Brogden; and affidavits had been filed proving that the mantles sold by him were in fact infringements. There was no appearance on behalf of the defendant; and his Lordship made the usual restraining order, with costs.

Larne Town Commission and the Gas-Works.—The Larne Town Commissioners are proposing to offer the Gas Company £4350 for their works, subject to the sanction of the Local Government Board.

Water Charges at Burton-on-Trent.—As a result of the recent litigation concerning the basis of the charge for water-rate at Burton-on-Trent, the Town Council recently requested the South Staffordshire Water Company to assess all the dwelling-houses in the borough on the rateable value, and so remove the inequality of price which now exists. The Directors have replied to the effect that they do not feel called upon to relinquish the powers conferred on them by their local Act of Parliament simply because an adverse legal decision unexpectedly deprived them of their right to exercise those powers in the extended portions of the borough.

MISCELLANEOUS NEWS.

BAKEWELL GAS-WORKS PURCHASE ARBITRATION.

Monday, Feb. 21.

(*Before Mr.* C. A. CRIPPS, Q.C., M.P., *Umpire.*)

The arbitration to fix the price to be paid by the Bakewell Urban District Council for the undertaking of the Bakewell Gas Company, the first day's proceedings in which have been reported in the "JOURNAL" (*ante*, p. 418), was resumed on the above-named day, at 45, Parliament Street, Westminster.

Mr. E. H. STEVENSON, M.Inst.C.E., was Arbitrator for the Company; and Mr. THOMAS NEWBIGGING, M.Inst.C.E., acted in a similar capacity for the District Council. Mr. A. J. RAM appeared for the Company; Mr. W. B. HEXTALL represented the Council.

Mr. *Alfred Lass* said he had, in company with Mr. Hall, acting on behalf of the Company, gone into the figures already put in evidence. With regard to the 9·02d. for purifying, repairs, and maintenance of works and mains, he did not agree with Mr. Hall, as the whole of the repairs were done by ordinary tradespeople, who sent in their accounts and were paid in the usual way.

Mr. *Corbet Woodall*, M.Inst.C.E., examined by Mr. HEXTALL, said for the purpose of forming and giving an opinion on this matter, he had made a personal inspection of the works. They were situated between the road and the river. He had drawn up a plan, which he produced, showing what part was freehold and what leasehold. The freehold portion, which was very small, he understood was bought for £10. The purifiers were fixed against the retort-house and the retort-bench. The retort-house was a very narrow one, so that the men had to have the doors open in order to draw the retorts. The works generally were fairly crowded. There was certainly no room for extensions.

By the UMPIRE: There was not space enough to carry on the business done by the Company in 1897. As a matter of general agreement, there should be a margin beyond the actual quantity of gas supplied; and in this case there was none. He thought he might say there was no margin upon any part of the works.

By Mr. STEVENSON: There was no margin upon the gasholders. If these were able to be used, they would contain 50,000 cubic feet. One holder was quite unfit for service; and the tank of another leaked so that it could not be filled up. The holder capacity was not much more than 44,000 cubic feet.

Examination continued: No. 1 holder was over fifty years old. With the exception of a small portion of No. 4 gasholder, the whole of the buildings and works were on leasehold land. On the termination of the lease, in about 14½ years, the property would revert to the landowner, who had sold his reversion to the Council.

By Mr. STEVENSON: He could not say whether the Council had yet paid for it.

Examination resumed: With regard to the condition and value of the mains, he had only formed an opinion from seeing just a little of them, from an examination which he had had made by a competent assistant, and from the evidence already given. From all this, he gathered that the mains were in a very bad condition indeed, that they were laid much too shallow in the ground, and that the pipes were in an unsatisfactory state. He had assumed a general relaying of the pipes throughout the town, and had made an allowance for the inevitable damage to them in the process of taking up and relaying. The mains were very small; and the proportion of 2-inch ones and under was abnormally large. It was not unlikely that the heavy percentage of unaccounted-for gas was due to the difficulty found in tapping service-pipes in so small a pipe as 2 inches. Out of a total of 7388 yards, 3236 yards were 2-inch pipes, and 780 yards 1½ inch. The circumstance of the pipes being of various diameters, would largely increase the probability of future outlay. It was unusual now to lay a pipe in a street of less diameter than 3 inches.

By Mr. STEVENSON: It was not unusual at the time these pipes were laid.

Examination continued: He was not dealing with the antiquarian value of the pipes, but their present value. The works generally were in a very dilapidated condition. The retort-bench was much cracked about, as was also the house in which it was built. The house was so narrow that the men had to stand in the open while drawing the retorts. There was not depth enough to work their tools in. The reconstruction of the retort-house and bench was urgently called for. The purifiers were in an equally unsatisfactory condition; the covers being practically held together by coats of paint. The scrubber was out of use, and the washer was falling to pieces. The poor state of the works was accounted for by the fact that the owners had shirked the idea of erecting new buildings in view of the fact that the lease was approaching its termination. The maintainable profit, in his opinion, was £410, which should be treated as a terminable annuity for 14½ years; and calculated on a 4 per cent. basis, it gave £4282. The mains he put at £1038, to which he had added 10 per cent. for special matters—making a total of £1141. Then he divided this in half for the cost of relaying the mains, which brought the amount down to £570. Deducting a third for worn-out and broken castings, made the value of the mains £380. Meters and service-pipes he had taken at the market value, less the discounts; and from this he deducted 30 per cent. for depreciation. This came to £235; and he had added for service-pipes £1115. Adding these together, and putting on £20 as the value of the freehold land, made an amount of £5032. Then he made a deduction of £1000, because of the necessary renewal of plant and apparatus at the works, and to cover what should be a margin for safe working upon them. Assuming the gasholders to be sufficient, he had deducted them from the value of the works, and called it £2000, which he thought would be agreed was about a fair sum; and he had taken 10 per cent. upon this to allow a margin. As the purifiers would have to be absolutely renewed, he had taken their value as £400, and divided it between the purchaser and the Company. For repairing the scrubber he allowed £20; and as the washers, which were worth about £25, would cost this sum to renew, he had absolutely wiped them out. Then he had allowed £350 for rebuilding the retort-house and arches containing fifteen retorts. The total cost would be £550; and of this he had put £350 against the Company. The renewal of the gasholders and the repair of the tanks would cost about £250. These sums totalled up to £1045; but he had only deducted £1000, leaving his valuation at £4032.

Mr. STEVENSON: Would not you, for the £1000 and the deduction you have made from maintainable profit, give any allowance for the saving in gas lost which would thereby accrue to the Local Authority.

Witness: I think that is fairly arguable; but I have not done so. The expenditure must be undertaken promptly, whether the works remain in the hands of the Company or are transferred to the Local Authority.

But it would improve the works?—It would reduce the unaccounted-for gas.

And improve the quantity of gas made per ton with new retorts?—That might be; but as far as it does so, I think those who do it are entitled to the credit.

Examination continued: There was no bye-pass to the scrubber, washer, or condenser. There was only one connection for all three, so that it was an extremely difficult arrangement to work. He was distinctly of opinion that the profit of 1897 could not be maintained without a very large expenditure. In fact, the present condition of the works was such that it might very well cause extreme anxiety, whether to the Company or to the Local Authority. The sum for maintenance and repairs should be raised from 3·14d. to 6d.

Cross-examined by Mr. RAM: He had not contemplated telescoping any of the gasholders. It would not be possible to make more gas on the works without absolutely re-building them; and even then the additional amount of producing power would be very small. The leakage—12·45 per cent.—was excessive; it ought not to be more than half this amount. Re-laying the pipes and improving the plant, would effect a considerable reduction in the leakage. The cost of this should be borne by the vendors, as they had not kept up the works. Had a proper sum been spent in the past, it would not be necessary to spend it now. The works were not in a condition to go on earning a profit; being in a very bad state of repair. If they were put in proper order, the Council would pay the capitalized value of the income. So far as he knew, he was giving the full value of the revenue which was now being earned, but the machine that was to earn the revenue was in such a condition that it could not go on doing so.

The UMPIRE: Supposing you had been advising the vendors, and it had not been a question of sale, and you told them they ought to spend £1000 on this work, would you have said they might expect to get corresponding benefits?

Witness: Yes.

To what extent would it pay for itself?—It would enable the Company to go on earning their revenue. I should most certainly have advised them to do this reconstruction work, or disaster would come on them directly.

Mr. NEWBIGGING: You consider that even the revenue you have taken is in jeopardy?

Witness: Certainly, that is the whole point.

And therefore, being in jeopardy, it should be set against any advantage which the Council would obtain?—Changing the word "jeopardy" into "security," it is the return they would get from the expenditure of £1000.

Mr. STEVENSON: Has it not been in jeopardy for many years?

Witness: It has been, more or less, for some years past.

This concluded the evidence, and

The UMPIRE, addressing Mr. Hextall, said he should be glad to hear any remarks he had to make on the point raised by the last witness, that this should be looked at as a 14½ years' term.

Mr. HEXTALL said the Company claimed to be entitled to be treated as freeholders, and to have the highest price put on the works as a going concern. Out of the amount so received, they said they would pay £1200 to the Duke of Rutland. But there was a vital error at the bottom of this calculation and contention. The Company asked for 24 years' purchase on a concern which had only a life of 14½ years. At the end of this time, the Company would have to hand over the property to the Duke without any compensation whatever.

Wednesday, Feb. 23.

The proceedings were to-day resumed before Mr. Cripps alone; it having been arranged that the Arbitrators should pair.

Mr. HEXTALL continued his argument on behalf of the Urban District Council, and called attention to the terms of the lease as supporting his contention that the Company had only a life of 14½ years, and that therefore a structural valuation ought to be made instead of a commercial one. To give a valuation based on 24 years' profits, when the lease had only 14½ years to run, involved an illogical conclusion, and one which no one would accept unless obliged to do so. Of course, anything could be done by contract between the two parties; and if the Umpire came to the conclusion that, in the words of this agreement, there was no escape from such a position, then the position must be faced, however illogical it might seem. It had been urged that Bakewell was an improving place, and that consequently more gas would be consumed; but he submitted that the evidence had utterly failed to support this contention. According to the evidence which he had called, the Company had been starved for the purpose of bringing expenses down to the lowest limit, and so, of course, making the profits swell, in order to increase the capital value, and put the figures before the Arbitrators as high as possible—to the advantage of the Company, and the disadvantage of the Urban District Council.

Mr. RAM having briefly replied on the whole case, the proceedings terminated.

The Award.

The following is the Umpire's award, which was received by the Clerk to the Urban District Council (Mr. V. R. Cockerton) last Friday:—

Whereas by a certain agreement in writing, bearing date the 17th day of November, 1897, made between the Most Noble John James Robert Duke of Rutland, Knight of the Most Noble Order of the Garter, of the first part, the Bakewell Gaslight Company (hereinafter called the Company) of the second part, and the Urban District Council of Bakewell in the county of Derby (hereinafter called the Council) of the third part, it was agreed that the Company should sell and

the Council should purchase the estate and interest of the Company in the hereditaments in the township of Bakewell delineated in the plan thereto annexed and coloured pink and green, together with all the works, mains, meters, and other gas apparatus, and other property, and all rights, powers and privileges, and easements belonging to the Company in or relating to the undertaking of the Company and also the undertaking of the said Company, except cash or securities in hand and choses in action; and whereas it was further agreed that it should be referred to Edmund Herbert Stevenson, Esq., of 38, Parliament Street, Westminster (a competent valuer named by the Company) and Thomas Newbigging, Esq., of Norfolk Street, Manchester (a competent valuer nominated by the Council), or in case of disagreement between the said valuers, then to an umpire to be appointed by them to fix the amount of purchase-money and compensation (if any) to be paid by the Council, and it was further agreed that the valuers or umpire should state in their valuation or award what sum per 1000 cubic feet of gas sold by the Company between the date of the completion of the valuation or arbitration and the 30th day of June, 1898, should be expended by the Company during that period in repairs to buildings, works, and mains; and whereas the said Edmund Herbert Stevenson and the said Thomas Newbigging did, by a writing under their hands, bearing date the 26th day of November, 1897, appoint me, Charles Alfred Cripps, Queen's Counsel, of 2, Mitre Court Buildings, Temple, in the City of London, to be the Umpire pursuant to the said agreement; and whereas the said Edmund Herbert Stevenson and Thomas Newbigging have not made any award concerning the matters referred, but have finally and altogether disagreed respecting the same: Now I the said Charles Alfred Cripps, having taken upon myself the charge of this reference, and having heard, examined, and considered the allegations, witnesses, and evidence of both the said parties concerning the premises, do make this my umpirage in writing of and concerning the premises in the manner following that is to say: I award and adjudge that the amount of the purchase-money and compensation to be paid by the Council shall be the sum of £11,522; and I further award and adjudge that the sum per 1000 cubic feet of gas sold by the Company between the date of the completion of this my valuation and award and the 30th day of June, 1898, to be expended by the Company during that period in repairs to buildings, works, and mains, shall be the sum of 5½d. per 1000 cubic feet of gas sold by the Company. In witness whereof I have hereunto set my hand this ninth day of March, in the year of our Lord one thousand eight hundred and ninety-eight.

PUBLIC LIGHTING BY INCANDESCENT GAS-BURNERS.

Notwithstanding the satisfactory results obtained by the adoption of the incandescent gas system for public lighting, hesitation is still shown in many quarters to give it a trial. Of course, success or failure will depend very much upon the conditions under which the system is installed; but assuming that the burners and mantles are fixed in lanterns of proper construction—that is to say, proof against both wind and water—they may be safely relied upon to give results quite equal to those which their advocates claim for them. At Liverpool, under the able supervision of Mr. C. R. Bellamy, the system has worked so well that the small number of mantle renewals has been almost phenomenal; but this "record" has been beaten at Yeovil. There the Gas Company have 300 lamps fitted with Welsbach burners, singly or in clusters up to five—a total of 350 burners; and last year the renewal of mantles was brought down to 1·5 per lamp, the cost of inspection and cleaning being about the same as under the old system. Coming nearer London, the town of Kingston-on-Thames, with its important suburb of Surbiton, furnishes a good example of a successful installation of the incandescent gas system. In the borough there are 500 Welsbach lights, which hold their own notwithstanding that the electric light has been in use for the past few years in some of the streets. In Surbiton there are 600 or 700 of the "C" type of bulb burners, fitted in the "Kingston" pattern street-lamps; while in the adjacent district of New Malden, Coombe, and Old Malden there are between 200 and 300 incandescent gas-lamps. Taking the whole of these places, the entire installation consists of about 1400 lamps. In the small, but interesting, little town of Princes Risborough, the Gas Company have put incandescent burners in 30 of the street-lamps; and last winter only one mantle was broken. This is attributed to the fact that good 16-inch lanterns are used, each of which was wind-proof before the bulb light was placed in it. In another small town—Kelso, in Roxburghshire—one-fourth of the total street lighting for three seasons has been done by incandescent gas-burners, to the very great satisfaction of the inhabitants. In point of economy, the Gas Company claim to take the lead; their mantle account for the past year being equal to 4·7 mantles per lamp. There are 25 burners in use, and only two glasses have been broken during the time the system has been at work. Absolutely shadowless lanterns, neat in appearance and easily kept in order, are employed; and very special care is taken that they are always clean.

The Appropriation of Gas Profits at Batley.—Considerable discussion has been going on at Batley on the question of the appropriation of the profits of the gas undertaking for the relief of the rates. It appears that in fourteen mills in the town private electric light installations have been put up, to the displacement of gas; and the consequence is that the consumers of the latter illuminant object to paying a higher price for it than is really necessary simply to relieve the owners of these mills of a portion of their rates—to the extent, in fact, of 6d. in the pound. In the case of a mill rated at £500, the proprietors save £12 10s. per annum at the cost of the gas consumers. Last year the amount received for gas was £15,500, the profit on which was £2000. If this were allocated among the producers of it, as it should be, in the shape of a reduction in price, the present charge of 2s. 3d. per 1000 cubic feet might be reduced to even shillings. In the case of large consumers, this would much more than recoup them for the additional 6d. in the pound put upon the rates; and moreover it would be treating them fairly. The matter is not likely to be allowed to drop.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

At the half-yearly general meeting of the Abingdon Gas Company next Thursday, the Directors will report a balance of net profit amounting to £1092. They will recommend that the sum of £250 shall be carried to the capital account, and that dividends at the rate of 7s. 6d. per share on the original and "A" shares, and of 5s. 3d. per share on the "B" shares, shall be declared. After payment of these, with deduction for income-tax, there will be a balance of £320 to be carried forward. The Directors propose to raise some additional capital to enable them to furnish prepayment meters. The total revenue in the half year was £2609, of which £1808 was for gas supplied; and the expenditure was £1703—leaving £906 to go to the profit and loss account.

The Directors of the Ascot District Gas Company, Limited, state in their half-yearly report that the number of consumers augmented from 392 in 1896 to 426 in 1897; while the sale of gas rose from 8,732,500 to 9,241,400 cubic feet—being an increase of nearly 6 per cent. on the half-year's work. The sale of coke went up to 60 per cent. A dividend of 3½ per cent., free of income-tax, has been declared.

At the annual meeting of the Dartmouth Gas Company yesterday week, it was reported that the receipts amounted to £3502, and the expenditure to £3031; leaving a balance of £471. Out of this it was decided to pay a dividend of 13s. per share. Satisfaction was expressed with the action of the Directors in purchasing property adjoining the works with a view to future extensions. The property cost £1104; and Mr. R. W. Prideaux, one of the Directors, explained that £304 had been paid out of income, and £800 raised by debentures at 3½ per cent. The gross income from the property was £61, while the interest was only £27; so that, apart from its prospective usefulness, it was a good investment. Mr. J. Tall, the Manager, said that new purifiers were needed; and the Company ought also to develop the supply of gas through prepayment meters. The question of fitting up houses at the expense of the Company was one deserving attention, as there were many people, connected with the Services and otherwise, who came to live in the town for a short period, and did not burn gas because they did not care to incur expense in the purchase of fittings.

In moving, at the recent half-yearly meeting of the Eastbourne Gas Company, the adoption of the report noticed in the "JOURNAL" for the 22nd ult., the Chairman (Dr. G. A. Jeffery) remarked that, unfortunately, the half year covered by it had not been quite so good as they would have liked; but they had three things to contend against. The first was the extreme mildness of the winter; the second, the low prices realized for residuals; and the third, the reduction they had made in the price of gas, by which they had given £800 to the consumers. By reason of these adverse conditions, they were not able to carry forward quite so large a sum as was done in the corresponding six months. He did not think the proprietors would cavil at this, since the Directors were again able to recommend the excellent dividends indicated in the report. The make of gas had been 125 million cubic feet; and they had disposed of 106 millions to private consumers and 10 millions to the Corporation for the public lamps. In making this quantity of gas, they had consumed 9314 tons of coal. They had introduced automatic prepayment meters, and had at present about 100 at work. For 1d. the consumer got 22 cubic feet of gas, and also the use of a cooking-stove; and when the shareholders met in August next, he hoped there would be 500 or 600 of these automatic meters out. A suggestion had been put forward that the prosperity of gas enterprises had probably reached its summit. He did not think any pessimistic view of the Company's prospects was justified; or that there was the least chance of their property lessening in value and prosperity. As an illustration of the temporary and exceptional cause of the slight falling off in revenue, he might mention that during the preceding fortnight, when there had been a snowstorm and two or three frosts, the consumption of gas had increased 15 per cent. This showed what a highly satisfactory position they would have been in had the winter months been uniformly cold. The report, which contained a recommendation to confirm an increase the Directors had made in the salary of the Secretary (Mr. J. H. Campion Coles) by £200 per annum, was adopted. In responding to a vote of thanks accorded to the Engineer and Manager (Mr. John Hammond) and himself, Mr. Coles expressed his appreciation of the proprietors' recognition of his services.

At the recent annual general meeting of the Hertford Gas Company, the Directors reported a balance of £1100 on the profit and loss account, out of which they recommended a dividend of 5½ per cent., free of income-tax. The Chairman (Mr. B. J. Gripper), in moving the adoption of the report, remarked that the new retort-house and coal-stores had been completed during the year, at a cost of £2391. This has been not only an extension of the works, but also a renewal of old plant. The value of the plant, &c., thrown out—viz., £1300—was chargeable against revenue; the difference (£1091) being transferred to the fixed plant account. There remained a balance of £1642, with which the business could be carried on. The result of working with the new plant (ten months only) was shown in a balance of £1147 on the revenue account, and the instalment of £433 which had been paid off the renewal of the retort-house charge made a total revenue of £1580, as against £1284 last year. The Directors had decided on reducing the price of gas to one uniform rate for lighting and cooking—viz., 3s. 11d. per 1000 cubic feet—and abolishing the present differential prices of 4s. 2d. and 4s. respectively. This reduction, together with the saving of the second meter-rent under the two-price system, was in the case of a consumer of (say) 24,000 cubic feet equal to a drop of 3d. Consumers who use prepayment meters will get 2 cubic feet more for each penny they put in the slot. The report was adopted, and the dividend declared. An increase was made by the shareholders in the Directors' fees.

The annual meeting of the Tonbridge Gas Company was held on Monday, the 28th ult., when the report and accounts for the year 1897 were submitted. Notwithstanding a third reduction of 2d. per 1000 cubic feet in the price of gas during the past three years, the balance on the revenue account was £2791. The profit and loss account showed a balance of £4170; and dividends at the rates of 11½, 8½, and 5 per cent. were recommended. After paying these, there would be a sum of £3008 to be carried forward. The Directors reported that the demand for cooking and heating appliances continued; about 220 having been fixed

during the year. The prepayment meter system had also proved very successful; 150 of these meters having been fixed in 1897. The Secretary and Manager (Mr. J. Donaldson) reported that the works and plant had been maintained in a satisfactory condition. The Chairman (Mr. J. Fagg), in moving the adoption of the report, congratulated the shareholders on the great success of the Company during the past year. They had reduced the price of gas 2d. per 1000 cubic feet, which took away £400; and yet they were able to pay the full statutory dividends under the sliding-scale, and add a substantial sum to the amount brought forward. He referred to the large increase in the quantity of gas sold; but stated that in consequence of the mildness of the weather the consumption had been much less than it otherwise would have been, as proved by the fact that during the recent colder weather the increase was half-a-million cubic feet. The motion was carried unanimously; and the dividends recommended were declared. A vote of thanks to the Directors was heartily accorded; and the proceedings terminated with a similar compliment to the Secretary and Manager, for his careful supervision of the Company's business.

The annual report of the Tunbridge Wells Gas Company shows that the capital expenditure last year was £2311. There was an increased sale of gas to the extent of about 1 per cent., which is considered satisfactory in view of the mild season. The residuals show an improvement on the preceding year. The total make of gas last year was 208 million cubic feet; and the revenue £28,000. The prepayment meters in use now number nearly 2000. The Directors are about to supply the Southborough Urban District Council with gas in bulk. The usual dividends have been declared.

At the annual general meeting of the Tynemouth Gas Company on the 29th inst, the Directors will report a profit of £6306 on the working in the past year. Adding the balance brought forward—£470—there will be a sum of £6776 available for distribution. Interim dividends of 5 and 3½ per cent. were paid for the six months ending June 30; and the Directors recommend similar payments for the second half of the year. This will leave a balance of £839. The revenue from the sale of gas was £25,880; from the rental of meters, stoves, and Bray's lamps, £1417; and from the sale of residuals, £7848—the total receipts being £35,309. The expenditure on the manufacture of gas amounted to £20,585 (coals costing £10,123); on its distribution, £3766; and on management, £1901—the total expenses being £29,003. Under the supervision of Mr. W. Hardie, jun., Assoc.M.Inst.C.E., the Company's Engineer and Manager, 27,015 tons 7 cwt. of coal and 944 tons 13 cwt. of cannel were carbonized last year; the quantity of gas made being 23 million cubic feet, or 8·9 per cent. in excess of that produced in 1896. The estimated production of residuals in the past twelve months was: Coke, 16,576 tons; tar, 281,934 gallons; and ammoniacal liquor equal to the production of 256 tons of sulphate of ammonia. The total number of meters in use at the close of 1897 was 5120, or 225 more than at the corresponding period of the preceding year; the number of stoves fixed and on rental being 548—an addition of 31.

The half-yearly report of the Winchester Water and Gas Company shows receipts on revenue account to the amount of £10,986; and expenditure, £6854—leaving a balance of £4132. The balance on the profit and loss account is £6305. A dividend for the half year at the rate of 10 per cent. per annum, free of income-tax, has been declared on the original capital, and at the rate of 7 per cent. per annum on the new capital.

The annual report of the Worthing Gas Company shows that the capital account stands at £74,058, as against £68,758 on June 30, 1897, and £66,268 on Dec. 31, 1896. Notwithstanding the large outlay necessitated by the erection of the new retort-house, recently inaugurated, and other additions to the works, which at no distant date will enable the Company to supply the district with gas at a still further reduction, the growth of the business has been such that, while previous to the outlay the capital employed for the purpose of the undertaking was £8 16s. 8d. per ton of coal carbonized, the Directors hope shortly to reduce it to £6 per ton. There has been an increase during the past year of 5½ per cent. in the sale of gas.

Water Companies.

The report of the Directors of the Bognor Water Company for the past year states that the income from water-rentals was £2086—being an increase of £235 on that of the preceding year; and the profit was £1258, as against £914 for 1896. After payment of interest on the debentures, the net available profit (with the balance of £531 brought forward) amounts to £1678. The Directors recommend the payment of a dividend on the preference shares at the rate of 5 per cent. per annum, and on the ordinary shares at the rate of 2 per cent. per annum, both free of income-tax—the balance of £529 to be carried forward.

At the recent meeting of the Kettering Water Company, the report presented by the Directors showed that the revenue for the past year was £5325, as compared with £5038 for the previous year; being an increase of £287. The balance of the profit and loss account amounted to £3278, including £68 brought forward. Deducting the interim dividend paid on Sept. 8, and the interest on debentures, &c., there remained an undivided profit of £1580. The Directors recommended the payment of a dividend at the rate of 7 per cent. per annum (being 7s. per share) on the "A" capital, and at the rate of £4 18s. per cent. per annum (being 4s. 11d. per share) on the "B" capital, both free of income-tax; making an average for the year of £6 12s. 6d. per cent. on the "A" capital, and £4 12s. 6d. per cent. on the "B" capital. This would absorb £1453, and leave an undivided profit of £127. On the motion of the Chairman (Mr. J. J. Roughton, J.P.), the report was adopted.

At the recent ordinary general meeting of the Woking Water and Gas Company, the Chairman (Mr. C. Horsley, J.P.) mentioned that the revenue for the past year had been £7368, against £6574 in 1896—an increase of £794, or rather more than 12 per cent. The expenses had been £3184, as compared with £2901 in 1896; showing an increase of £283. The profits were £4184—an increase of £511. Referring to the additional shafts which had been sunk, the Chairman said they were producing fairly good results. Additional land had been purchased at Clandon, on which it was intended to construct a new covered service reservoir to contain 500,000 gallons. The number of new services laid last year was 387, against 200 in 1896. The report was adopted, and a dividend declared at the rate of 4 per cent. per annum.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, 9, Queen Street Place, E.C.—Colonel J. Le Geyt Daniell in the chair.

The Secretary (Mr. T. Guyatt) read the notice calling the meeting; and the report and accounts for the half year ending December last (the principal features of which were referred to in the "Journal" for the 1st inst.) were then submitted.

The Chairman said his duties that day were of a light and pleasing character, with one exception, and that was that he had to allude to the loss of the services as a Director of their old friend Mr. A. J. Dove. Owing to ill-health, he felt that it was impossible for him to continue to attend the meetings. Consequently he tendered his resignation; and it was with much regret that his colleagues had to accept it. Turning to the accounts, he said that one of the points which had, no doubt, attracted the attention of the shareholders was that the item of sundry creditors in the balance-sheet had increased by something like £844, and that, on the other side, the item of sundry debtors had risen. The explanation of this was that it was one of the results of the war. The people had been pressed for money; and they had not discharged their accounts in the way they usually did. But since the publication of the accounts, the collections had been much more favourable; and the consumers were paying up more readily. This showed that the pressure to which they had been subjected was being gradually removed; and the Directors hoped that in a short time they would see the item of sundry creditors down to its normal amount. In the revenue account, the cost of coal was about £300 more; but this was entirely attributable to increased freight. Under the head of depreciation, renewals, and repairs, there was a charge of £726 in connection with one of the gasholders, which was seriously damaged during a gale in October last. On the other side of the account, the gas-rental was £9471, which was an increase, compared with the second half of 1896, of £250. The profit on fittings was £444 more. The balance of profit on the revenue account was £3291. He was happy to say that the unaccounted-for gas (which in 1896 was an important item) had been reduced by 3·7 per cent. The shareholders would expect from him a statement regarding the most important clause in the report—that referring to the concession. As they were aware, the Directors had been for some time in communication and negotiation with the Ottoman Government in connection with this matter; and although the negotiations were completed as far as the renewal of the concession for 40 years from the expiration of the present one was concerned, there were a few questions still to be settled. Therefore, until these were arranged, he would ask the shareholders not to press him too much for further information. They had got over the greatest difficulty in the matter; but they had had considerable competition from outside people, who offered "advantages" which were pleasing to the ear, if not to the pockets, of those with whom they wished to do business. Their proposals, indeed, were of such a perfectly ridiculous character that they could never have carried them into execution. Their own negotiations had been well handled by the Manager, to whom they had been entrusted; and when he told the shareholders that the new concession of 40 years secured to them 44 or 45 years' working, it would be seen how important the negotiations had been to the Company. He concluded by moving the adoption of the report and accounts.

Mr. Stephenson R. Clarke seconded the motion. He remarked that the Greek residents, some of whom were their best customers, had been driven away by the Turkish war; but they were now gradually returning to Smyrna. He trusted that this would enable the Directors to present at the next meeting a report even better than the present one.

Mr. W. Hughes asked if there was any truth in the statement which had appeared in a financial paper as to a company being formed for supplying electric light in Smyrna, at about half the cost of gas.

The Chairman replied that he had no confidence in the statement. Somebody was stated to have been in Smyrna endeavouring to make terms for a concession with the view of starting an electric lighting company; but he had not received much encouragement. Referring to a suggestion by Mr. Simmelkjor that the meetings should be held annually, the Chairman said they were compelled by their Articles of Association to meet half yearly.

The motion was unanimously carried.

A dividend at the rate of 7 per cent. per annum on both classes of shares was then declared.

The Chairman said the next question for consideration was the proposal to raise new capital; and to this the Directors had given very careful attention. They were of opinion that it would be to the interests of the shareholders to issue it in the form of debentures. New capital was absolutely necessary; and they had decided to limit it to £25,000. He did not say all this would be necessary; but he did think that £20,000 would be required, although not all at once. The Directors proposed to take authority to raise the debentures at 5 per cent. interest. There should be no difficulty in placing the debentures at this rate of interest; and he would be astonished if they were not all taken up by the shareholders themselves. He proposed a resolution consenting to the borrowing powers being exercised to an extent not exceeding in the aggregate £25,000, and authorizing the Directors to raise this sum on mortgage bonds or debentures, at such times and on such conditions as they thought fit.

Mr. Clarke seconded the motion.

The Chairman, replying to Mr. A. Skaife, stated that, under the new contract, they were bound to lay out a certain sum in extending the works.

Mr. Charles Gandon mentioned that the Directors had practically made a contract for a new gasholder to contain 250,000 cubic feet. The capacity of the two existing holders was only 125,000 feet; and sometimes they had to send out more than 250,000 cubic feet in a day. It was also proposed to spend about £2000 on the distribution system—chiefly in enlarging the mains; and there were other alterations and extensions which would absorb a considerable amount of money.

Mr. A. M. Paddon asked whether there had been any great increase in the consumption per length of main.

Mr. H. W. Andrews replied that the consumption was four times what it was a few years ago, and the mains were the same.

The motion was unanimously carried; and the retiring Directors (Colonel Daniell and Mr. Andrews) and the Auditors (Messrs. Butt and Cooke) were re-elected.

The CHAIRMAN, in proposing a vote of thanks to the Secretary (Mr. Guyatt), the Engineer and Manager (Mr. John Gandon), and the staff at Smyrna, said the latter gentleman had had a great deal of work thrown upon him in connection with the new concession; and he had shown much tact and ability in looking after the Company's interests.

Mr. J. L. CHAPMAN seconded the motion, which was heartily agreed to.

Mr. GUYATT briefly replied on behalf of himself and Mr. Gandon.

The services of the Chairman and Directors were also acknowledged; both Mr. CHAPMAN and Mr. PADDON remarking upon the successful way in which the Board had throughout conducted the negotiations for the new concession.

HARROW AND STANMORE GAS COMPANY.

The Half-Yearly Meeting of this Company was held yesterday week, at the Albion Tavern, Aldersgate Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY and ENGINEER (Mr. J. L. Chapman) having read the notice convening the meeting,

The CHAIRMAN moved the adoption of the report and accounts. He commenced his address by giving some figures as to the manufacturing operations. He said the quantity of coal carbonized was 3106 tons, or 127 tons more than in the corresponding period of 1896. The production of gas was 31,821,000 cubic feet—an increase of 1,235,000 feet. The quantity sold was 29,656,000 cubic feet; being an increase of 1,390,000 feet. These figures showed that the additional gas sold was more than the increase in the make, which clearly indicated that the leakage had been less. The yield of gas per ton of coal carbonized was 10,245 cubic feet; while that sold was equal to 9548 feet per ton of coal, or about 93¼ per cent. of the make. The amount of gas unaccounted for was 1,715,000 cubic feet, or only 5·4 per cent. of the quantity produced, which was very satisfactory. At Harrow proper, they sold in the Michaelmas quarter 5,203,000 cubic feet; being an increase of 179,000 feet. But in the Christmas quarter, they sold 11,296,000 feet, which was a decrease of 26,000 feet. This showed that Harrow, like most other towns, had felt the effects of the warm weather and brightness, and had not, in consequence, used so much gas. At Sudbury and Harrow Weald, the consumption in the Michaelmas quarter was 1,153,000 cubic feet, being an increase of 188,000 feet; while in the Christmas quarter, it was 2,488,000 feet, or an increase of 295,000 feet. At Stanmore, in the Michaelmas quarter, they sold 1,986,000 cubic feet, which was an increase of 260,000 feet; and in the Christmas quarter, the consumption was 4,580,000 feet, or an increase of 534,000 feet. In the half year at Stanmore, they sold 6,566,000 cubic feet, or 794,000 feet more than in the corresponding period of 1896. These increases at Harrow Weald and Stanmore were exceedingly satisfactory, because he believed they represented permanent increases, and were connected with the building that was going on in these neighbourhoods. The total gas-rental for the half year was £6475; being an improvement, compared with the December half of 1896, of £318. With regard to the residuals, during the whole of the half year coke was a drug; and the average price was only 6s. 3d. per chaldron. The make of tar was very good—10 gallons, or more, per ton of coal carbonized; but it only realized 1¼d. per gallon. The production of sulphate of ammonia was not bad—averaging 1 ton for every 100 tons 19 cwt. of coal carbonized. But for the whole of the residuals, the receipts only amounted to £975, as against £1033. From all sources of income they received £7745; being an increase of £289. The total expenditure was £5237; being £138 more than in the corresponding half of 1896. The profit was £2508, as against £2357, showing an improvement of £150. They had earned sufficient profit in the half year to pay the usual dividend; and with this result—having, in common with other gas companies, had such an unfavourable period for their business—they must be satisfied. In conclusion, he mentioned that the new gasholder they had been erecting had been completed, and was working satisfactorily.

Mr. CHARLES HORSLEY, J.P., seconded the motion, which was unanimously carried.

Dividends at the rates of 7¼ per cent. per annum on the original "A" capital, 7 per cent. on the "B" capital, 5¼ per cent. on the "C" capital, and 6 per cent. on the guaranteed shares were next declared.

On the motion of the CHAIRMAN, seconded by Dr. J. W. LEE GLAISHER, the retiring Director (Mr. A. H. Baynes) was re-elected; and on the proposition of Mr. CHARLES GANDON, seconded by Mr. F. LENNARD, the outgoing Auditor (Mr. Horace J. Rydon) was also re-appointed.

The CHAIRMAN having moved a vote of thanks to Mr. Chapman for the attention he had given to the Company's affairs during the half year,

Mr. HORSLEY seconded, remarking that their Engineer had certainly laboured very hard for them. One of the satisfactory features of the working was the diminution in the unaccounted-for gas. The new gasholder having been completed, there was now no necessity for doing any work at Stanmore; and they hoped to make arrangements by which they would not have to open those works again.

Mr. CHAPMAN having briefly replied,

Mr. A. F. PHILLIPS proposed a vote of thanks to the Chairman and Directors, remarking that, when they remembered the mildness of the winter, and the severe competition they had in Harrow with the electric light (which had taken away some of their largest customers), he thought the shareholders would admit that the balance-sheet was eminently satisfactory.

Mr. ASKHAM seconded the motion, and it was unanimously agreed to.

The CHAIRMAN, in responding, said Mr. Phillips had referred to one matter upon which he (the Chairman) never touched. It was true the masters of the Schools had gone in for the electric light; but the Gas Company still held their ground. In the half year, they had had an increase in Harrow of about 1 per cent.; but the average in the other two districts was 14 per cent. While they had an increase half year by half year, though it be but a small one, it was in the right direction.

This concluded the proceedings.

MANCHESTER AND SALFORD SANITARY ASSOCIATION AND WATER GAS.

Several matters were dealt with in a report which the Committee of the above Association presented to the members at their annual meeting on Monday last week; and a perusal of the document shows that much useful work has been taken in hand. But one of the subjects referred to by the Committee—viz., carburetted water gas—has evidently not been sufficiently studied. The report stated that deputations have waited upon the Gas Committees of Manchester and Salford, and presented memorials setting forth the serious dangers caused to the public health by the admixture of water gas with coal gas. The reply from the Salford Gas Committee was that they had made no provision yet for manufacturing water gas; and if they contemplated such a step, they would keep the memorial in mind. The Manchester Gas Committee having already laid down plant, gave no such assurance; and the Committee accordingly determined to address a memorial to the President of the Local Government Board. They could not, the report proceeded, too strongly protest against the introduction into dwelling houses of so dangerous a means of illumination as water gas; and they desired to direct the attention of the citizens of Manchester to some recent statistics which, in their opinion, corroborate in a striking manner the views formulated by the Committee in their memorials. During the year 1897, in Philadelphia, where water gas is largely used as a domestic illuminant, 34 deaths occurred from poisoning by carbon monoxide in water gas. Of these 18 were suicidal, 14 accidental, and 2 homicidal. The relatively excessive preponderance of suicidal deaths was, the Committee considered, an extremely significant fact, showing that the inhabitants of Philadelphia had had the poisonous nature of water gas so forcibly and so frequently brought home to them as to make its deadly properties a matter of common knowledge. The Lord Mayor of Manchester (Mr. Alderman Gibson) was presiding; and, in moving the adoption of the report, his knowledge of gas affairs enabled him to inform the members that the only matter in regard to which the Committee appeared to be at sea was water gas. He asserted that it was no more dangerous than ordinary gas, and had some special advantages. It had been in use in Manchester for four or five months; and nobody seemed to know anything about it notwithstanding that the quantity sent out every day was about 3 million cubic feet. No doubt water gas was dangerous, but so was every kind of gas; the thing was not to inhale, but to burn it.

THE HALF-YEARLY ACCOUNTS OF THE BRADFORD GAS AND ELECTRICITY COMMITTEE.

Satisfactory Results in the Gas Department—Increased Business, but Diminished Profits, in the Electricity Department.

At the Meeting of the Bradford City Council last Tuesday, the MAYOR (Mr. T. Speight), as Chairman of the Gas and Electricity Committee, presented their minutes for adoption, and also made the usual half-yearly statement as to the results of the working of the departments. The minutes included the resolution appointing Mr. Thomas H. Duxbury, of Manchester, as Assistant Gas Engineer, at a salary of £250 a year, as already noticed in the "JOURNAL."

The MAYOR, in moving the adoption of the minutes, said that during the half year 66,668 tons of coal and 15,561 tons of cannel had been carbonized. A total of 861,916,000 cubic feet of gas had been made; being a decrease of 13 per cent. on the previous year. The quantities of residuals produced were: 33,917 tons of saleable coke, 5597 tons of tar, and 11,794 tons of ammoniacal liquor. The yields of gas, coke, and tar per ton of coal carbonized all showed an improvement over the results obtained in the corresponding half of 1896. The average cost of coal and cannel was 10s. 0·17d. per ton, against 9s. 11·45d. Coke realized 6s. 2·61d., as compared with 5s. 11·98d.; but tar only fetched an average price of 20s. 4·84d. per ton, as against 26s. 2·23d. The values of tar and of its products had diminished very considerably since the previous year. Turning to the revenue account, and omitting the odd shillings and pence, coal and cannel had cost £42,207, or £701 less than in 1896. Purification had cost £1839, or £422 more; but this increase was almost made up for by the higher receipts for spent oxide. Engineers' salaries had amounted to £560, as last time. Stokers' wages came to £10,917, or £469 less than in 1896, owing to rather less coal being carbonized, and to the fact that there was one pay-day less in the last half of 1897 than in the second half of 1896. This was also the reason for the slight reductions in the payments for wages under some other heads, as several advances in wages had been made since 1896. Repairs to works accounted for £4243, or £1364 less than last year, when a large portion of the expense of the new condensers and scrubbers at Thornton Road works was incurred. The Corporation were now reaping the benefit of the improvements to the condensing and scrubbing plant which had been carried out during the past five years. Repairs of retorts were much less than usual; being £2105, or £1522 less than in 1896. Repairs to mains and services had cost £2100, or £37 more; team labour, £2545, or £225 less; meter inspection, £1096, or £100 less; lighting and repairs of public lamps, £4282, or £214 less; salaries of clerks, £745, or £61 less; collection, £250; stationery and printing, £143, or £21 more. Rates amounted to £3036, or £268 more; meters, to £1191, or £300 less; miscellaneous expenses, to £1450, or £302 more; stamp duty, to £153; and bad debts and abatements, to £439, or £43 less than in 1896. The revenue from the sale of gas was £78,504, being £906 less; meter hire, £321, or £11 less; coke, £8851, or £578 more; tar, £5710, or £940 less; sundries, £692, or £425 more; spent oxide of iron, £1349, or £372 more; meters, £1349, or £119 less; stoves and cookers, £51, or £45 more; chemicals, £5745, or £800 more; rents, £526, or £7 less. The total revenue amounted to £103,103, or an increase of £227 on the corresponding half of 1896; and the total expenditure to £79,341. The gross profit was £23,269; being an increase of £4130 on the previous year. Bank interest took £31, or £52 less; sinking fund, £4250, or £695 less; interest on loans, £8443, being £158 less; and income-tax, £954, or £125 more. The net profit amounted, therefore, to £9877, or nearly double that

made for the corresponding half of 1896, when it was £4973. In addition to this profit, it must be remembered that the whole of the street lighting was paid for by the Gas Department; and the cost of this amounted to more than £11,000 during the half year. Whenever possible, all expenditure had been placed to revenue account. The total charged to capital during the half year only amounted to £808 for new mains in fresh streets. The total amount of outstanding loans and debentures at the close of the half year was £489,614. He might mention the fact that, at the end of the financial year (March 31), the sum total of the net profits earned by the gas undertaking since its purchase by the Corporation in 1871 would exceed the total amount of loan capital by £3000. Passing on to the Electricity Department, his Worship said that the total income for the half year was £10,842, as compared with £9570 in the corresponding period of the previous year, or an increased income of £1271. The total expenditure for the six months, including interest and sinking fund, was £7943, against £5570 for the corresponding period. The profit for the half year was therefore £2899, as against £4000 for the similar period of 1896. The decrease of £1101 in profits as compared with the corresponding period, was explained chiefly by the increased interest and sinking fund charges, amounting to £885 extra, together with sundry items of repairs to machinery, including renewal batteries, &c. The number of consumers was at present 640, as against 470, or an increase upon the corresponding half year of 36 per cent. The total number of units of electricity supplied was 550,300, against 477,342, or an increase of 15¼ per cent. The total profits since the opening of the works, in September, 1889, to December, 1897, after paying interest and sinking fund, amounted to £16,733; and the total amount written off for depreciation had been £7307—leaving £9425 to be appropriated as the Council might direct. The trade profit—*i. e.*, the profit before charging interest and sinking fund—was £4 11s. 9¼d. per cent. for the half year on the capital outlay. The net profit—after charging interest, sinking fund, and depreciation—was £1 2s. 7d. per cent. for the half year. Taking the December and June half years together, the trade profit was £11,234, representing £8 3s. 3d. per cent. per annum on the capital outlay. He thought the Council had reason to be entirely satisfied with the working of the department.

Mr. W. C. Dixon seconded the motion, which was adopted.

THE TRURO CORPORATION AND GAS AND WATER WORKS.

The Committee recently appointed to consider the question of the desirability of purchasing the Truro Gas and Water Works recommended the Truro City Council to obtain the opinion of an expert concerning the value of the two undertakings as a guide to the Council and the ratepayers generally. The recommendation came before the Council at their meeting last Tuesday—the Mayor (Mr. S. J. Polkinhorn) presiding.

Mr. E. L. Carlyon, in moving the adoption of the proposal, said the Committee felt it was absolutely necessary to have the opinion of a gentleman conversant with these matters, in order that they might have something tangible to lay before the Council and the ratepayers.

Mr. T. L. Dorrington seconded the motion.

Mr. J. T. Jacob thought the two questions ought to be separated An expert consulted as to the gas-works might not be able to give them the value of the water-works. If the motion were confined to the water-works, he would support it.

Mr. J. Rogers considered the resolution premature, and advised that the Companies should be amicably approached, informed of the desire of the Corporation to purchase, and asked for balance-sheets for (say) three or four years. When this had been done, it would be quite time to talk of engaging an expert to advise them.

Mr. A. Blenkinsop moved that the words "and gas" be struck out, so as to confine the action of the Committee to the water-works. He contended that there was little prospect of an increased revenue from the gas-works. These works were admirably managed by the Company; and he did not see anyone in the Council who would be able to suggest economy not already observed in the working of the concern. Then there was to be considered the advance made by the electric light, and the possibility that the gas-works might not always be so valuable as they were now. With regard to the purchase-money, Mr. Silverthorne, who had been employed by the Falmouth Corporation, put it at 2½ times the capital. The present capital of the Gas Company was £22,000, and this multiplied by 2½ would amount to £55,000. On the present capital, the Company paid 6 per cent; but if the amount were increased to this extent, the profit would not pay interest on the loans at 3 per cent., to say nothing of the sinking fund. With regard to the water-works, the case was different. The well water in use in part of the city was very bad; and on sanitary grounds it was necessary that the water from the works should be laid on to many houses not now provided with it. If they secured the water-works, they could get compulsory powers of supply, and thus improve the sanitary condition of the city, and at the same time increase the revenue of the undertaking.

Mr. S. Trevail seconded the amendment, and said their best thanks were due to the Water Company, who brought water into Truro when the Corporation failed to do it, and who should be courteously approached before an expert was appointed.

Mr. Dorrington contended that the revenue from the gas-works would increase, and that if the Corporation possessed both undertakings, they could make them pay as well as the Companies did.

Mr. E. G. Heard thought the proposal unbusinesslike. If they wanted to purchase the water-works, they should approach the Company first. It was not the fact that the Directors of the Gas Company had decided not to sell at any price. If it were shown to be an advantage for the city to possess the gas-works, and the Corporation were prepared to pay a fair price, the Directors would consider the matter in a reasonable way.

Mr. Carlyon, in reply, said the Directors of the Gas Company evidently felt that they had a good property, or they would not hold to it so tightly. If the works were an excellent thing for the Company, they would be equally good for the Council.

The amendment was carried by 12 votes to 5; and the motion, as amended, was then adopted.

RIPON GAS-WORKS EXTENSIONS.

Local Government Board Inquiry.

On behalf of the Local Government Board, Colonel A. Durnford held an inquiry at Ripon last Thursday respecting an application by the Corporation for a Provisional Order to enable them to borrow a further sum of money and use additional lands for the manufacture of gas, to extend the period allowed for the repayment of the gas debt under the City Act of 1865, and to make new provisions with regard to the application of revenue.

The Town Clerk (Mr. M. Kirkley), in support of the application, stated that the gas-works were established in 1830 by a Company with a capital of £9000, in 360 shares of £25 each. In 1865, the City of Ripon Act was passed empowering the Corporation to purchase the works for £9850, and to borrow £18,000 for the purpose and for extensions and improvements. The cost of obtaining the Act was £1200. The Corporation bought an acre of land for extensions, and carried out various improvements; expending altogether up to Aug. 30, 1868, about £13,250 out of the £18,000. The erection of new offices, weigh-houses, and gasholder, increased the debt to £16,717 by 1879. The remainder of the authorized borrowing powers (£1283) was expended between 1879 and 1891. It had been the usual practice with all borrowing powers to repay the capital within 30 years from the date of borrowing, and not from the issue of sanction to borrow. It had been contended, however, that the sum set apart for sinking fund in 1870 should have been sufficient to repay the whole of the £18,000 in 30 years. If this view was correct, a considerable part of this amount would only have been borrowed for 18 to 23 years; and the last sum (£474), for only 9 years. It was for these reasons that the Corporation appealed to the Local Government Board to allow a further term of 10 years in which to repay the present outstanding capital of £3120; allowing the sinking fund on the balance of £14,880 repaid to drop, and thus relieve the revenue account to the amount of £640 per annum for sinking fund and interest. If the present sinking fund was kept up, the debt would be repaid before Jan. 1, 1902; but this would be a serious burden on revenue. The total sum proposed to be borrowed was £10,000.

Mr. *E. E. J. Anderson*, the Gas Manager, stated that during the last few years there had been an increase in the annual manufacture of gas from 26 to nearly 32 million cubic feet, or 22 per cent. During the same period, the daily make had increased from 129,000 to 166,500 cubic feet, or 28 per cent. In the first two months of this year there had been an increase of 389,000 cubic feet, compared with the same period of last year. Since 1894 the consumers had increased from 800 to 1043; and the public lamps, from 228 to 268. During last year there were 177 new consumers; and 99 additional cooking-stoves were fixed. He estimated that, when all the improvements were made, there would be an annual saving over present cost of £190 to £270 per annum; and the leakage would be considerably lessened by the new mains.

The *Mayor* also supported the application.

Mr. *Anderson* stated, in reply to the Inspector, that the price of gas was 3s. 4d. per 1000 cubic feet, with 5 per cent. reduction to ordinary consumers, and 20 per cent. for cooking and heating purposes.

Mr. *R. Wilkinson*, speaking with regard to the extension of the term for repaying the old capital, stated that, if the repayment of £3120 was deferred for 10 years, the charge for sinking fund and interest, including that for £10,000 of new capital, would be only £950 per annum, as compared with £974 paid last year for the old debt.

There was no opposition.

ELECTRIC LIGHTING NOTES.

A Local Government Board inquiry was held at Morecambe last Wednesday relative to an application by the District Council for sanction to the borrowing of £10,000 for electric lighting, for which purpose £26,000 has already been obtained. It was stated that the extra money was required on account of an increase in the number of arc lamps on the promenade from 75 to 100, and the great demand for electric light at the west end of the town.

It is reported that the Yorkshire House-to-House Electric Supply Company have refused the price offered by the Parliamentary Committee of the Leeds Corporation for their undertaking. The proposal was to give the Company £210 of 2½ per cent. redeemable Leeds Corporation stock for every £100 which may have been properly expended on capital account. In view of this refusal, it is understood that the Corporation will proceed with their Provisional Order, by which they seek power to issue 5 per cent. irredeemable stock.

At Manchester last Wednesday evening, an alarming explosion occurred in the roadway at the junction of Withy Grove and Corporation Street. A portion of the footpath was blown up; and a number of the flags were lifted with great violence, and sent through a shop window. The explosion occurred in close proximity to an electric cable, which runs at this point some 2 feet below the surface. It is surmised that there was a fusing of the electric wires, and that the flame came in contact with gas, and so caused the explosion. An opening about 5 or 6 feet square was left by the explosion.

Some time since, it may be remembered the Morecambe District Council purchased the plant and cables of the old Electric Lighting Company; but, under a clause in the agreement, the Council claimed a diminution in value on the ground that certain portions of the plant were found to have depreciated. The Council and the Liquidator of the Company being unable to agree as to the extent of the depreciation, the matter was referred to the arbitration of Mr. A. H. Gibbings, of Bradford, and Mr. F. Thursfield, of Chester. On the whole plant, the Council claimed a diminution in value of £2540; but the finding of the Arbitrators is that £1179 is the extent of the depreciation. The parties are to pay their own costs, and half each of the expenses of the award.

The Price of Gas in North London.—The increase made in the price of gas by The Gaslight and Coke Company is 2d. per 1000 cubic feet to ordinary consumers—bringing the figures up to 3s.—while prepayment meter consumers will in future be charged 1d. for 22 cubic feet of gas, or at the rate of nearly 4s. per 1000 feet, instead of 3s. 4d. as previously.

THE METROPOLITAN WATER SUPPLY COMMISSION.

Fourteenth Day—Monday, March 7.

(*Viscount* LLANDAFF, *Chairman*, *Sir* JOHN E. DORINGTON, Bart., M.P., *Sir* G. B. BRUCE, M.Inst.C.E., *Major-Gen.* A. DE COURCY SCOTT, R.E., *Mr.* A. DE BOCK PORTER, C.B., *Mr.* H. W. CRIPPS, Q.C., *and Mr.* R. LEWIS.)

The Commission sat at the Westminster Town Hall.

The following are the Counsel engaged: Mr. POPE, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., for the New River Company; Mr. LITTLER, Q.C., and Mr. LEWIS COWARD for the Kent Water Company; Mr. PEMBER, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. RICKARDS for the Chelsea Water Company; Lord R. CECIL for the Hertfordshire County Council; Mr. BALFOUR BROWNE, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Sir R. NICHOLSON for the Middlesex County Council; and Mr. GABRIEL P. GOLDNEY (Remembrancer) for the Corporation of the City of London. The Southwark and Vauxhall Water Company are represented by Messrs. BIRCHAM AND Co.

Mr. *W. H. Dickinson*, Chairman of the Water Committee of the London County Council, in further examination by the CHAIRMAN, continued his statement regarding the proceedings of the Council in reference to the water question. In accordance with resolutions of the Council, an attempt was made in 1896 to arrive at a form of Bill which would be acceptable to both parties on the Council for the purchase of the Water Companies. The agreement, so far as it was arrived at, was embodied in the report of the Parliamentary Committee of the Council which was discussed by the Council on Nov. 10, 1896, to which witness now referred in detail. The agreement arrived at was only as between the members of the Sub-Committee. It was submitted to both parties, and was accepted by the Progressives, but rejected by the Moderates. The proposals under the head of agreement were roughly that the Council should purchase, and should hold until the relationship of the outside Authorities to the Council had been settled by a Commission.

The CHAIRMAN: As far as I have been able to follow it, the recommendations were, so to speak, throwing over the agreements that had been come to with the Authorities of the outside areas, and leaving the whole matter of the supply of Outer London to be settled by a Special Commission?

Witness: Yes.

That was abandoning, or going back from, the arrangements that had been previously made with the Metropolitan Counties?—It would be to a certain extent.

This was the point of objection of the Moderate party?—No; I think the great issue between us at that time was as to whether the County Council should be the Authority, or whether there should be a new body. The feeling was that the County Council would have got into the saddle, and that the question would to that extent have been prejudiced. As to the arbitration clause which that Committee produced, witness said it was the result of compromise; being wider in one respect, and possibly narrower in another, than clauses that had been previously produced. It made a clear reference to nothing being allowed for compulsory sale, but left to the arbitrator the question of the value of the back-dividends.

You were giving up the back-dividends, and also the question of the increase of the rateable value?—We were giving up the point that the question of the back-dividends should be dealt with by a Committee of the House of Commons.

Mr. BALFOUR BROWNE said the words were that the arbitrator was to have absolute unfettered discretion.

The CHAIRMAN: I should have thought that was hardly sufficient for the object in view.

Major-General SCOTT remarked that there was another point in which this arbitration clause was weaker than the original—namely, that it was permissive as to the evidence and considerations on behalf of the Council which the arbitrator should receive; whereas in the former clause it was obligatory on him to accept such evidence.

Witness (continuing) said the resolutions of the Committee were adopted; and in December, 1896, the Parliamentary Committee made a further report which proceeded on the resolutions of the previous month. This was the report in which the Committee decided to promote eight Bills—not one only—for the purchase of the Companies. The report contained yet another arbitration clause.

Asked what was in the mind of the framers of this clause when they used words that both on behalf of the County Council and the Companies the arbitrator should not be precluded by any legal objections from considering all contentions affecting the value of the undertakings, witness said they wished to protect themselves against technical objections preventing the arbitrator going into such matters; they desired the arbitrator to have the case before him as widely as possible. He could not say that it was intended that the arbitrator should have power to disregard an Act of Parliament, but that he should have authority to consider the equity of the case. The County Council, under the clause, might have urged before the arbitrator that Parliament might have placed the Companies under more rigorous control than was actually the case.

The CHAIRMAN asked whether witness meant that the arbitrator should overrule the Companies' Acts of Parliament to the extent of saying they should not get the benefit of the enormous increase in rateable value, on which their charges were based.

Witness replied that he thought the Council would contend that, in assessing the prospective value of the Companies, it should be considered that they would have to meet a very strong agitation by Liberals in Parliament, which might result in cutting down their authorized charges.

Mr. PEMBER: And therefore the arbitrator is to treat them as if that had been done!

Mr. BALFOUR BROWNE: Yes, if he thinks fit.

Witness then went on to refer to the deliberations that took place in the Council on the appointment of the present Commission; the Council in the end approving of a system under which either the Council should acquire the undertakings and supply the outside Authorities in bulk, or each of the County Authorities should supply themselves. The water, if it were furnished by the Council in bulk, would be at a price fixed by Parliament, so that the outside Authorities could not be said to be under the thumb of the Council.

The CHAIRMAN: As I have understood your evidence, the feeling of the County Council seems to be that no control is efficient unless carried out by legislation which should deal with water-rates, dividends, capital, and so on?

Witness: I think we should say that a new system of control must be preluded by a revision of the position of the Companies—that if they are to go on as private Companies, subject even to a continuing control by ourselves or by any other authority, we should insist that such questions as their capital, rights of charges, and so forth, should be revised by Parliament beforehand.

Unless you get some such operation as that, you can hardly give any substantial relief to the water consumers. You mean that, in their present statutory position, the relief to the consumer seems to be in the remote future?—The Companies can go on in their present position, and naturally they will go on taking everything they can. If Parliament, in 1852, when fixing the rates of charges on rateable value, had been able to realize what the profits of the Companies would be, they would never have granted these powers of charging. Witness claimed that the position of the Companies should be revised in the light of their experience since 1852. A very stringent revision of this kind might somewhat cheapen the price that would have to be paid for undertakings. In an arbitration, the Companies would urge that their revenue would go up enormously; and the Council would like to be able to argue that it would not be allowed to do so.

The CHAIRMAN: I am afraid the statutes do not lend themselves to that.

Witness (continuing) said he believed purchase to be the only solution that would be effectual. He was then taken back to the personal memorandum which was dealt with at the previous sitting, in which he arrived at the conclusion that purchase at £30,000,000 would mean increasing the rates by 30 per cent. He explained that these calculations were not very serious. He took the interest, he believed, at 3 per cent., and the period for repayment at 60 years; but he had now no doubt that Parliament would allow the period for repayment to be 100 years, which would make an enormous difference. The income he took as what it actually was at the time; the figure might have been £838,000 a year. He agreed that, in the immediate future, a further expenditure of some £15,000,000 would have to be incurred.

The CHAIRMAN: Assuming that the supply was all in one hand, and that every economy of management, &c., was realized, Mr. Haward calculated that the improved income of 1901 would be quite sufficient to pay interest and sinking fund on a repayment in 80 years, on a sum of £34,000,000. If from £34,000,000 you take £15,000,000, you have left £19,000,000 only. You could hardly expect to purchase the eight Water Companies for this, could you?

Witness: But surely if this water is required, it will be paid for.

But not for many years?—It will be paid for by new consumers.

But it must be years before it becomes remunerative?—I have no doubt it will be exactly as in the case of Birmingham. For the first few years, it will be necessary either to charge rather more possibly, or to get Parliament to assent to a suspension of the sinking fund for a time, or some arrangement like that. Witness said that no doubt the question of future cost was very serious; but it was one that all Municipalities had to face. It was a question of what price would have to be paid for the Companies. Some portion of the future requirement would make itself felt in the price; for the arbitrator would consider the fact that a Company was at the end of its resources. The matter of the new supply might, or might not, result in a charge on London. Parliament were not likely to give the Companies new supplies without some means of recouping themselves; and as the recoupment would come out of the pockets of the consumers, it was as broad as it was long. As to the relative cost of water from the Thames or Lea, and from a distance, witness said the Council thought that any more taken from the rivers would be dearer than that obtained from a distance; but even the water at present taken from the rivers was very expensive. At the present moment Welsh water would be cheaper than that obtained from the Staines reservoirs. The Engineer to the County Council and Sir Benjamin Baker and Mr. Deacon, all agreed that the Welsh supply would be the cheapest and best for London. Witness was then examined as to the powers which the County Council possessed under various Acts, with regard to exercising supervision over the Companies; it being suggested that they already possessed powers which they did not enforce. He pointed out, however, that the Council had great difficulty in getting evidence; and in several cases in which they had proceeded, they had been unsuccessful—as, for instance, in the matter of the recent East London water famine. Further power had been conferred by the Metropolitan Water Act of 1897; and the Council were now engaged in considering what action to take under it. What the Council most needed was information as to what the Companies were doing. They should know exactly what the pressure in the mains was every day; it ought not to be left to the controlling Authority to discover what was wrong. It was suggested that there was readily available machinery for seeing what was the condition of supply in various districts, in the local inspectors of nuisances, surveyors, &c., who made rounds day by day. Witness, however, did not think it would be easy for such persons to do this work; and he objected to bringing in the Authority as a kind of prosecutor of the Companies. He was not aware whether, in towns where the supply was in the hands of the Corporation, there was any remedy as against the Authority.

Mr. DE BOCK PORTER: If these Companies are not purchased, will not the sinking fund have the effect of retarding the reductions in price of water to the consumer?

Witness: In the case of the West Middlesex Company, every penny that goes to the sinking fund comes out of the consumers' pockets.

Mr. DE BOCK PORTER: Is not the sinking fund very prejudicially affected by having to purchase the stock of the particular Company? As I understand it, the contributions are invested in the stock of the various Companies.

Mr. G. PRIOR GOLDNEY: That is so, under the Act.

Mr. DE BOCK PORTER: As time goes on, and the sinking fund increases, there will be a larger amount to be invested in the stock of the Company, which will send up the price, and therefore prejudice the question.

Witness: Yes. The sinking fund was only devised as a temporary expedient. Continuing, he said the great advantage of the Welsh scheme was that it was capable of future development, and would not limit the supply of London to the two rivers. The problem of supplying London

would not be met by furnishing 420 million gallons daily, as suggested in the report of the last Commission. If the Commission had taken 50 instead of 40 years in their calculations, they could not have solved the problem by the Staines scheme. As to control, the members of both parties on the Council held that no system of control could be effective; and that the question must be ultimately settled, as in the case of 800 or 1000 authorities in the country, by purchase.

In reply to Major-General Scott, witness said, as to carrying out the system of control as it now existed, there had not been any hesitation on the part of the County Council in proceeding against the Companies; but the Council had always been advised that great difficulties existed. Since the Council had come into existence, the Companies had performed their duties very much better than they used to. The only effectual control that could be exercised was in the administration of the Companies. There should also be power to demand information regarding their works and their supply in a general way. The Council had asked the Companies to allow them to inspect their filtration arrangements, but had been refused.

By Sir J. Dorington: At the present time, the Council had stations where their representatives had gauges for testing the pressure at which the Companies supplied. The Companies were not supposed to know this; and witness would not have given the information, if he had not been asked for it. One of the difficulties of the Council had been to get information without the Companies being aware of it.

By Mr. Cripps: He did not consider it right to strike off the claim for back-dividends altogether.

Mr. Cripps: Therefore something must be added for that. Why should it not be left to the arbitrator, the same as any other point?

Witness: Well, the last proposition of the Council was to do so. We have a new Council now; and I am not at all sure that they will offer the same terms as were proposed before.

The Chairman: The arbitration terms you mean?

Witness: Yes. Continuing, he said that among the suggestions which the Council made for the consideration of the Commission in connection with the subject of control, were that the County Councils in London and outside should have power to analyze water and to compel the Companies to improve the method of treatment, and to make provision against possible pollution; to demand returns and improved form of accounts, and power to appeal to an auditor against items of expenditure; avoidance of agreements between the Companies, so as to bring into activity the competition intended by Parliament to operate for the benefit of the consumers; as an alternative to competition, compulsory amalgamation; the reduction of rating powers—first, to one uniform basis over the whole county, and, secondly, to such a figure as would carry out the intentions of Parliament in 1852; limitation of power of charge for sale of water; revision of nominal capital; limitation of dividend to the total amount actually paid at the present moment—the balance to be devoted either as rebate to consumers or to reduction of charge for water supplied for public purposes; limitation of the quantity of water to be taken from the Thames and Lea, independently of any permission given by the Conservators of the two rivers; obligation upon the Companies to bring into Parliament forthwith proposals for additional supplies adequate for the requirements of the next sixty years; and obligation upon the Companies to forthwith carry into full effect the requirements of the Royal Commission of 1893, with regard to the water of the Thames and Lea.

No arbitration clause you have suggested yet would put you on such velvet as this control?—That is so.

Mr. Balfour Browne: If you give us that, I think the Lands Clauses Act would do.

Witness added that, after these things had been adopted, the next step would be to purchase at the value to which the Companies would then be reduced.

The Commission then adjourned till yesterday, the 14th inst.

The fifteenth sitting of the Commission was held yesterday, at the Westminster Town Hall—Lord Llandaff presiding. On the Commissioners taking their seats, Sir Joseph Leese, Q.C., M.P., announced that he had been instructed to appear on behalf of the Kent County Council. Mr. W. H. Dickinson, whose examination-in-chief was concluded at the previous sitting, was cross-examined by Lord Robert Cecil, with a view to showing that Hertfordshire would be adversely affected by the London County Council purchasing the Water Companies' undertakings and then re-selling them to the surrounding Local Authorities.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I have two subjects this week which I would have been pleased not to have had to write upon; but they are of much too great importance to be avoided.

The first is the complication at Peebles. There the plot thickens. The beginning of strife is as the letting out of water. What looked at first as if it were a friendly negotiation, has developed into a desperate struggle, the outcome of which, I make bold to say, will benefit no one except the lawyers. When I wrote a fortnight ago, the Town Council had given notice to the Gas Company of their resolution to have the Company wound up as at May 26 next. The reply of the Company has come, in the shape of a requisition by three of the Committee of Management, otherwise Directors, of the Company, to their own Secretary, asking him to convene the shareholders to consider a resolution to have the Company registered under Part VII. of the Companies Act, 1862, and subsequent Acts, under the name of the Peebles Gaslight Company, Limited. The Secretary has summoned the shareholders to meet on Monday next. The receipt of the circular calling the meeting rather disconcerted the Council, though the Town Clerk says that he expected it. Its effect was to send the Council once more for legal advice. This time they called in Mr. J. B. Balfour, Q.C., one of the foremost of Scotch Advocates; and his advice was of a drastic nature. Special meetings of the Town Council and Police Commission were held on Tuesday evening last to consider it, which they did in the presence of a large

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 580.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin 10 p. c.	25—24	..	4 0 9
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 8
300,000	100	Jan. 3	5	Australian 5 p. c. Db.	105—107	..	4 13 6
200,000	5	Nov. 11	6½	Bombay, Ltd.	6½—6¾	..	4 16 4
40,000	5	,,	6½*	Do. New, £4 paid	5—5½	..	4 14 6
380,000	Stk.	Feb. 24	12	Brentford Consolidated	295—300	..	4 0 0
240,000	,,	,,	9	Do. New	228—233	..	3 17 3
50,000	,,	,,	5	Do. 5 p. c. Prf.	145—150	..	3 6 8
159,375	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	134—138	..	2 18 0
220,000	Stk.	Sep. 15	11½	Brighton & Hove Orig.	275—280	..	4 2 3
218,820	,,	,,	8½	Do. A. Ord. Stk.	200—205	..	4 2 11
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	130—135	..	3 14 1
420,000	20	Sep. 30	11½	British	56—57	..	3 19 0
50,000	10	Mar. 11	11½	Bromley, Ord. 10 p. c.	25—27*	+1	4 5 2
75,000	10	,,	8½	Do. 7 p. c.	20—22*	+1	3 17 3
500,000	10	Oct. 14	6	Buenos Ayres (New) Ltd	9½—10½	..	5 17 1
98,122	Stk.	Dec. 30	4	Do. 4 p. c. Db. Stk.	97—99	..	4 0 10
150,000	20	Mar. 11	8½	Cagliari, Ltd.	30—31*	..	5 6 5
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.	17—18	..	4 8 11
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	59—61	..	4 18 5
550,000	Stk.	Oct 14	13½	Commercial Old Stock	340—345	..	3 18 3
200,750	,,	,,	10½	Do. New do.	255—260	..	4 0 9
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Db. do.	154—157	..	2 17 4
800,000	Stk.	Dec. 15	12	Continental Union, Ltd.	225—235	−12½	5 2 2
200,000	,,	,,	9	Do. 7 p. c. Prf.	208—213	−4	4 4 6
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	310—315	..	4 8 11
168,400	,,	,,	11	Do. B 7 p. c.	255—265	..	4 3 0
535,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	134—137	..	3 16 8
60,000	,,	,,	5	Do. 5 p. c. Prf.	140—143	..	3 9 11
486,090	10	Jan. 27	11	European, Ltd.	25—26	−½	4 4 7
354,060	10	,,	11	Do. £7 10s. paid	17½—18½	−½	4 9 3
5,922,110	Stk.	Feb. 10	12½	Gaslight & Coke, A, Ord.	293—298	+1½	4 5 6
100,000	,,	,,	4	Do. B, 4 p. c max.	121—125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	315—320	−2	3 2 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150—155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220—225	..	3 6 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	200—204	..	3 8 8
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	313—318	−3	3 2 11
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	185—190	..	3 3 2
1,061,150	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	137—140	..	2 17 2
294,850	,,	,,	4½	Do. 4½ p. c. do.	156—159	..	2 16 7
958,000	,,	,,	6	Do. 6 p. c. do.	205—210	..	2 17 1
70,000	10	Oct. 28	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	Nov. 11	10	Imperial Continental	212—217	−½	4 12 2
376,400	100	Feb. 1	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Db. Stk.	103—106	..	3 6 0
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	Dec. 15	6	Malta & Medn., Ltd.	5½—6	..	5 0 0
560,000	100	Oct. 1	5	Met. of Mel- bourne 5 p. c. Db. 4½ p. c. Db.	112—114	..	4 7 8
250,000	100	,,	4½		109—111	..	4 1 1
541,920	20	Nov. 11	5	Monte Video, Ltd.	15½—16½	..	6 1 3
150,000	5	Nov. 26	8	Oriental, Ltd.	8—8½	..	4 14 2
135,000	5	,,	8	Do. New, £4 10s. pd.	7—7½	..	4 16 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—2	..	4 0 0
60,000	5	Mar. 11	7	Ottoman, Ltd.	4⅝—5*	..	7 0 0
420,000	100	Nov. 2	6	People's Gas 1st M. Bd.	104—109	..	5 10 1
500,000	100	Dec. 1	6	of Chicago 2nd do.	103—108	..	5 11 1
250,000	10	Sep. 30	10	San Paulo, Ltd.	16—17	..	5 17 3
135,000	Stk.	—	10	Sheffield A.	250—253	..	3 19 0
209,053	,,	—	10	Do. B.	250—253	..	3 19 0
447,427	,,	—	10	Do. C.	250—253	..	3 19 0
5,531,250	Stk.	Feb. 24	5½	South Metrop., 4 p.c Ord	137—140	−7	3 15 0
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Db. Stk.	105—108	..	2 15 7
60,000	Stk.	Mar. 11	12	Tottenham and A.	285—295*	+6	4 1 4
60,000	,,	,,	9	Edmonton B.	205—215*	+4½	4 3 9
183,380	10	Dec. 30	7	Tuscan, Ltd.	13¾—14½	..	4 16 7
149,900	10	Jan. 3	5	Do. 5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	Dec. 30	10½	Chelsea, Ord.	335—340	..	3 1 9
150,000	,,	,,	5*	Do. 5 p. c. Prf.	177—180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p. c. Pf. Stk., 1875	157—160	..	2 16 3
175,785	,,	Sep. 30	4½	Do. 4½ p. c. Db. Stk.	160—165	..	2 14 6
1,720,560	Stk.	Oct. 14	7½	East London, Ord.	224—229	−7	3 5 6
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Db. Stk.	161—164	..	2 14 11
390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	105—107	..	2 16 1
700,000	50	Dec. 15	7½	G'd Junct'n, 10 p. c. max.	120—125	−3	3 0 0
295,000	Stk.	,,	4	Do. 4 p. c. Db. Stk.	147—152	..	2 12 8
708,000	Stk.	Feb. 10	13	Kent	358—363	..	3 11 8
160,000	,,	,,	7	Do. New, 7 p. c. max.	213—218	..	3 4 3
1,043,800	100	Dec. 30	10	Lambeth, 10 p. c. max.	298—303	−7	3 6 0
406,200	100	,,	7½	Do. 7½ p. c. max.	230—235	..	3 3 10
350,000	Stk.	Sep. 30	4	Do. 4 p. c. Db. Stk.	147—150	..	2 13 4
500,000	100	Feb. 10	13	New River, New Shares	445—450	−2	2 17 10
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	147—152	−1	2 12 8
902,300	Stk.	Dec. 15	6	Southw'k & V'xhall, Ord.	155—160	−8	3 15 0
126,500	100	,,	6	Do. do. 7½ p. c. max.	160—165	−2	3 12 9
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	175—180	..	2 15 6
1,019,585	,,	Oct. 14	4	Do. 4 p. c. A Db. Stk.	146—149	..	2 13 8
1,155,066	Stk.	Dec. 15	10	West Middlesex	313—318	−3½	3 2 11
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
					* Ex div.		

contingent of ratepayers. Everything was cut-and-dry for the meeting; and the following resolutions were adopted, with only one dissentient voice—that of Bailie Spalding, who is a Director of the Company. The resolutions embody Mr. Balfour's opinion. They were: "Resolved to object to, and to protest against, the proposed meeting of the Gas Company and the proposed registration of the Company, and instruct the Clerk to intimate this to the Secretary by letter; also instruct the Clerk, whom failing, the Chamberlain, to attend the meeting on March 14 and table a formal protest. Further resolved to intimate to the Gas Company that, in terms of the Company's obligation of Jan. 27 last, the Company shall, on or before May 26 next, remove the portions of the works erected outside the limits of the Company's feu, and as from said date give up occupation of all ground outside the feu." "Resolved to intimate to the Gas Company that the Company shall cease using the streets for the conveyance of gas after May 15 next, and shall, on or before the said date, lift all their pipes in the streets of the burgh." The first resolution was adopted by the Town Council, and the second by the Police Commission. They have been intimated to the Secretary of the Company, who has been enjoined, lest there should be any miscarriage, to be good enough to acknowledge the intimation. Bailie Ramsay wrote that he was unable to attend the meeting, but that if anything arose which was likely to drag the town into litigation, he would leave the Council at once. The fear of litigation was mentioned at the meeting; and the Clerk's contemptuous reply was: "They may litigate." The Town Clerk is a solicitor; and he ought to know that if they litigate, the Council must litigate also, or the Company will get the decree they ask for. It was not the fear of litigation which was brought up; it was the cost of it.

This introduces the point I am anxious to take up first, which is, What is to be the benefit to anyone of all this pother? It is clear as noonday that they cannot prevent the Company registering themselves; and when once they are registered, these resolutions lose their effect, because there will be a new Company, unless renewed. The Council will then be in this dilemma: If they renew the resolutions, they will render themselves liable to be called upon to leave the undertaking—that is, to sell out their shares, which would then be by auction, and, having done their best to depreciate the undertaking of the Company, the result of their efforts would be a low price, and consequent loss to the burgh; or they would have to remain in the Company, and be subject to statutory powers. These powers include the right to use the streets, upon paying compensation. Thus the second resolution may be set aside. As to the first, the Company need have no fear to litigate upon it. I do not doubt but that the Council, as superiors of the ground, have a right to order the removal of buildings upon land to which the Company have not a title; but the Company have not been in unauthorized occupation of the ground. They reclaimed part of it, in 1874, at a cost of over £2000 per acre, and handed a portion over to the town; and for another part, they have been paying the town at the rate of £14 per acre. These are onerous conditions, and stamp the arrangements under which all this has been done as serious business, acquiesced in by both parties, and not to be lightly disturbed. Good cause must be shown before a delinquent granter of a right—granted, too, for onerous considerations—can withdraw it so long as the grantee abides by the conditions. The Company have abidden by the conditions, and have done more—they have taken away any possibility which might have existed of the Council showing cause why the arrangement should come to an end. The Council did not institute proceedings for their eviction; it was the Company who approached the Council with a request for a consolidation of their title. Nay more, the Corporation at first agreed to the request, and, for the satisfaction of legal form, obtained the undertaking that the Company would remove the buildings when called upon to do so. It was an afterthought to seek to enforce this undertaking to the prejudice of the Company. The feudal law, I know, has a long reach; but I very much doubt whether even it provides for eviction in a case where consent has been given by the superior, unless for non-payment of the stipulated duties. But cannot the Company, as soon as they register themselves, take lands compulsorily? I think they have this power. The Company thus seem to have the best position. The Town Council have picked a quarrel with them, for the sinister purpose of depreciating their undertaking. The Company have meanwhile checkmated the Council. A deadlock must ensue which can only be removed by litigation. In this litigation, the chances are decidedly in favour of the Company. If the ratepayers of Peebles considered the matter aright, they would see that, it being almost a certainty that the Company will come out of the controversy victorious, if there be an intention to take over the undertaking of the Company, the proceeding would then be by arbitration. They would thus have, after all, to pay a fair, perhaps a high, price; and, in addition, they would be obliged to defray the costs of the litigation which is ahead. I fancy they would then feel disposed to cut short the proceedings of their Town Clerk and Burgh Treasurer, and require that the subject should be approached in the proper spirit. They cannot have it too strongly impressed upon them that, fighting as they are doing is not only against the sentiments of the community, but is likely to be unprofitable to themselves. The Company and the Corporation have been good neighbours for half-a-century. The former have done well by the town, and are doing well by it yet. Not to mention the enormous rate of feu-duty of £14 an acre, they also pay £20 a year for the use of the streets; and they have reduced the price of gas recently by 5d. per 1000 cubic feet, which is equal to a gift of nearly £300 a year to the community. Smartness in striking a bargain is one thing; this attempt to extinguish a Company and to get their property for the price of old iron, is another. It reminds me of an incident which occurred some 25 or 30 years ago, in which a man purchased the rights of superiority in a country town. This town had advanced greatly. A number of the earlier feu-duties were nominal sums of a shilling a year or so. They were so small that the former superior thought them unworthy of collection; but the new man, taking advantage of the non-payment and of the feudal law, seized the feus and resold them at greatly increased duties. That man is to this day, to my knowledge, shunned, cold-shouldered, and snubbed by nearly everyone. What gain would it be to the public reputation of the Corporation of Peebles were they to succeed in transferring to the Municipality the valuable property of the Gas Company without payment? I have seen not a few attempts to depreciate a gas undertaking before a transfer; but I have never known them to succeed. This is the most

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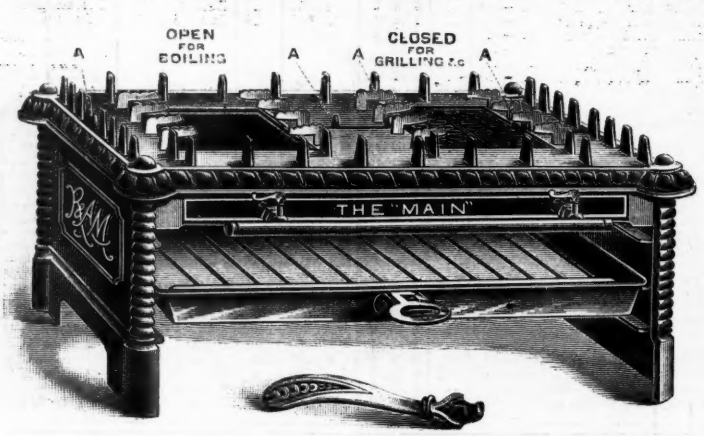

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barefaced endeavour of all that I have seen; and if equity determines it, it will succeed least of all.

The other subject relates to what the newspapers have been styling "The Irregularities at the Perth Gas-Works." It is a delicate subject; but it must be faced. The Gas Commissioners held a special meeting on Monday, at which they received the report of their Special Inquiry Committee. It is a long document, but all that it brings out is: That Bailie Wright was supplied with coal and other goods from the gas-works, for his gas-works at Bankfoot, and paid for them; that he also had the services of three men from the Perth Gas-Works, to put the Bankfoot works in order—the men's names being taken off the pay-sheets while they were absent from the city; that Mr. Wilson visited Aberfeldy on one occasion, and gave advice as to the gas-works there; that Mr. Wilson was consulted by the Dunkeld Gas Company, and advised them as to the purchase of a gasholder from Pitlochry; that the Dunkeld people, having failed to get a contractor (at their repeated request), he sent three men to Dunkeld for some weeks to re-erect the holder—the men's names being taken off the pay-sheets in Perth; and that all these matters were correctly entered in the books at the works. The Committee came to the conclusion, in their own words, that they "are satisfied that nothing wrong, in the sense of its being corrupt or injurious to the interests of the Gas Commissioners, has taken place. They are, however, strongly of opinion that both the Convener and the Manager were wrong, and showed great want of judgment; the one (considering his position as Convener) in asking, and the other in giving, goods and articles from the gas-works to the Convener to the extent revealed in the account produced. With regard to Mr. Wilson's visits to Bankfoot and Aberfeldy, while they condemn them, the Committee do not attach such grave importance to them as to his unwarrantable conduct in sending men to Bankfoot, and in undertaking a contract at Dunkeld, and also sending men there from the gas-works for weeks together at a busy time of the year, and not a slack time, as stated by him, to execute the works without a word to his Committee on the subject. It will be seen, however, that he pleads ignorance, expresses regret, and promises not to repeat the offence. The Committee are of opinion that Bailie Wright was much to blame in allowing men from the gas-works to be working for him at Bankfoot at a time when their services were required at the gas-works." In the Commission, this report was approved of; and the Manager was strictly enjoined that he should abstain from such acts as were mentioned and condemned in the Committee's report, and he was informed that he must, in future, devote his whole time to the services of the Gas Commission. A motion was made to the effect that they ask the Manager to hand in his resignation; but it was not seconded.

Thereafter Bailie Wright tendered his resignation of the position of Convener of the Works Committee, and made an explanation as to the reason why the estimates for the new gas-works had risen from £35,000 to £50,000, and then to no less than £70,000. His observations were to the effect that, deducting things which had not been in the estimate prepared by Mr. Whimster, Mr. Wilson's estimate would be reduced to about £61,000; and that, whereas Mr. Whimster proposed to erect 168 retorts, with a capacity of 7000 cubic feet per mouthpiece per 24 hours, or a maximum daily output of 1,176,000 cubic feet, Mr. Wilson proposed to erect 224 retorts of a capacity of 8000 cubic feet per 24 hours, or a maximum daily output of 1,792,000 cubic feet. Bailie Wright went on to detail a number of items in which Mr. Whimster's estimate had been exceeded; and he stated that the £6000 for West's stoking machinery was not included in Mr. Whimster's estimate, as it was not then thought of. The result of his analysis was to bring Mr. Wilson's estimate, on the same basis, down to £48,914. Mr. Whimster's scheme was to save them £600 in carting; and Mr. Wilson's was to save them £900 more by the use of West's stoking machinery. Bailie Wright's resignation was accepted; several members of the Commission paying him a high tribute for his services. Now, as regards Bailie Wright's explanations, it is open to say that Mr. Whimster's estimates were framed nearly three years ago, and much has happened since then; notably the engineers' strike, which has put up the estimates of all engineering work. Further, without detailed specifications, it is impossible to institute a comparison. As regards the other matters, I am inclined to look upon the procedure in them as the making of a mountain out of a molehill. The actions of Mr. Wilson and Bailie Wright cannot be justified theoretically; but I suppose that in practice they are not uncommon. The ado that has been made over them has had the effect of causing the Commission to lose the services of Bailie Wright, which, at this time, is very much a swopping of horses in the stream, and may not be to the advantage of the Gas Commission.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 12.

Sulphate of Ammonia.—The market continues to droop; and to-day's quotations are £9 5s. per ton f.o.b. Hull and Leith, and £9 7s. 6d. f.o.b. Liverpool. A fair amount of business has been done at the declining prices; but the volume has been less than might have been expected, having regard to the period in the season now reached. Probably the less favourable weather has partly deterred buyers; and it is to be feared that undue importance is being attached to the decrease in shipments January-February, as compared with January-February, 1897—some 4000 tons. If it were remembered that the January-February, 1897, shipments were partly from stock—that during that period demand was overhauling supply—it would be seen that the shrinkage in exports this year did not represent so much accumulation of stock as seems to be very generally assumed. The continued unsatisfactory demand has, whatever the reason, tended to disconcert makers; and there has been during the week a more general desire to be making sales. Forward business is still neglected, although London sellers have reduced their quotations about 5s. per ton.

Nitrate of Soda remains firm at 7s. 6d. per cwt. for fine quality, with a good business passing.

LONDON, *March* 12.

Tar Products.—The market continues quiet and uneventful. Benzols show no sign of improvement; while the better tone noted in pitch has not so far accentuated itself. A moderately steady outlet exists

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for solvent naphtha and carbolic acid; and there is also more inquiry for heavy naphtha at former rates. Anthracene is held at the Committee's prices, and very little is offering. Creosote keeps fairly firm; and should the present demand continue, it will undoubtedly be scarce during the summer months. The indifferent and low price of products is reflecting itself in contracts for tar which have recently been made. The very low price realized by the London Gas Companies is making itself felt throughout the country; and distillers are experiencing very heavy losses from high-priced tar bought last year. To-day's values are: Tar, 12s. to 15s. Pitch, east coast, 19s. 6d.; west coast, 15s. to 16s. Benzols, 90's, 1s. 3d.; 50's, 1s. 5½d. Toluol, 1s. 10d. Solvent naphtha, 1s. 6½d. Heavy naphtha, 1s. 3d. Crude, 30 per cent., naphtha, 6½d. Creosote, 2¼d.; liquid, 2⅜d. Heavy oils, nominal, 42s. 6d. Carbolic acid, 60's, 1s. 11d. Naphthalene, 50s.; salts, 30s. Anthracene, "A" quality, 5½d; "B," 4½d.

Sulphate of Ammonia.—This market has not improved during the week, but the reverse; and prices are rather lower. Makers are firm; and the business doing is mostly in second hands. Nominal quotations are: London and Liverpool, £9 10s. per ton; Hull and Leith, £9 5s. to £9 7s. 6d.—all less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The protracted spell of severe weather has not only enabled collieries to continue on full time and clear away a considerable quantity of stock, but it has also checked what threatened to be an early downward move in prices. The position of colliery proprietors has thus been substantially improved, in view of the approaching summer season. For the present, prices are very steady at 10s. to 10s. 6d. per ton at the pit for best Wigan Arley; 8s. 6d. to 9s., for Pemberton four-feet and seconds Arley; and 7s. for common house-coal. With regard to steam and forge qualities, though the demand for these is fairly good, supplies continue in excess of requirements; and prices are difficult to maintain. From 6s. to 6s. 6d. are average figures at the pit mouth; while as low as 5s. 9d. is reported to have been taken for steam coal for shipment. From 7s. 6d. to 7s. 9d. are the prices at which buyers have been able to purchase for delivery at ports on the Mersey, though 8s. 3d. to 8s. 6d. is still quoted for some of the best qualities. Engine classes of fuel are moving off fairly well; and in some quarters there is a disposition to harden up on late rates. But any material advance is scarcely obtainable, though for forward contracts colliery proprietors generally are indifferent about booking at present rates. Average prices remain at about 3s. to 3s. 6d. per ton at the pit for common sorts, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for best qualities of slack.

Northern Coal Trade.—The tendency of the coal trade of this district has been rather better in the last few days; orders drifting here that might have been sent to Wales but for the dread of an interruption of work there. Best Northumbrian steam coals have advanced to 8s. per ton f.o.b.; steam coals remaining steady at 3s. Household coals are quieter now there is milder weather; and there is no alteration in manufacturing coals. In gas coals, there is a smaller home consumption; but the exports begin to show some signs of increase. The price is from 7s. 6d. to 7s. 9d. f.o.b. for best Durham kinds. The contracts are now in the market for the Rotterdam and Amsterdam coal supplies; and it is expected that a large share of that for the former port will be again secured by Durham collieries. No change is expected in the second contract. There is no alteration in the price of gas coke; but, with a lessening output, the stocks are decreasing.

Scotch Coal Trade.—There is almost no change to record in the coal trade; but a good volume of business is being done. Inquiries are on for next year's supply for gas-works. The prices will likely be a little higher than those being paid this year, though cannel, of which there are some large stocks, may be got at reasonable rates. The prices quoted are: Main, 6s. 6d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 3d.; and splint, 7s. 3d. to 7s. 6d. The shipments for the past week amounted to 131,472 tons—a decrease of 7341 tons upon the previous week, but an increase of 940 tons when compared with the corresponding week of last year. For the year to date, the total shipments have amounted to 1,144,163 tons—an increase upon the same period last year of 16,709 tons.

Proposed Purchase of Grimsby Gas and Water Works.—At a meeting of the Grimsby Town Council last Friday, a Committee of twelve members was appointed to consider and report as to the advisability of the purchase by the Corporation of the properties of the Grimsby Gas and Water Companies, and the terms and conditions upon which the undertakings could be acquired.

The Assessment of the York Gas-Works.—The Assessment Committee of the York Union met last Wednesday to hear the appeal of the York United Gaslight Company against the assessment of the gas-works. Mr. John R. Hill, Mr. John Bellerby, Directors of the Company, Messrs. W. H. Cobb and Son, Solicitors, Mr. Charles Sellers, Manager and Secretary, and Mr. Thomas Newbigging, were present. Messrs. Castle and Sons' rateable value was £8235, as against £4016, as ascertained by Messrs. T. Newbigging and Son. Eventually the rateable value was reduced to £5500.

Extension of the Wolverhampton Gas-Works.—Owing to the rapid increase in the consumption of gas at Wolverhampton, the Gas Company have decided to considerably extend their works. The plans for the new works, capable of producing 2½ million cubic feet of gas per day, with further provision for extending to 5 million cubic feet, have been prepared by Mr. G. Winstanley, Assoc.M.Inst.C.E., of Coventry; and the contracts have already been placed for carrying out the whole of the work in accordance with his recommendations. The retorts will be upon the inclined principle on the system perfected by Mr. Winstanley, and fitted with his patent regenerative furnaces and specialities. The contracts for the iron-work have been placed with Messrs. R. & J. Dempster, Limited; and for the whole of the structural work, brickwork, and excavation, with the Winstanley Speciality Company.

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ENGLAND.

	Daily Capacity. Cubic Feet.		Daily Capacity Cubic Feet.
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SALTLEY WORKS, BIRMINGHAM	2,000,000	WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	HALIFAX	1,000,000
COLCHESTER	300,000		
BIRKENHEAD	2,250,000		
SWINDON (New Swindon Gas Company)	120,000		

AMERICA.

TORONTO	One New Set.
OTTAWA	One New Set.
TORONTO	(Second Contract) Improving Four Double Superheater Settings.
LINDSAY	Re-modelling Plant.
MONTREAL	Two New Sets and other parts of Plant.
BELLEVILLE	One "Springer" Setting Re-modelled with M-W-P. Patents.
OTTAWA	(Second Contract) One New Set.
BRANTFORD	Additional Improvements to Existing Setting.
ST. CATHERINES	Additional Improvements to Existing Setting.
KINGSTON, PA.	One New Set and other Parts of Works, including New Purifiers and Gasholder.
PETERBOROUGH	One Set and Re-modelling Works.
WILKESBARRE, PA.	Two New Sets and other parts of Plant.
ST. CATHERINES	(Second Contract) One New Set.
BRANTFORD	(Second Contract) One New Gasholder.
BUFFALO, N.Y.	1,500,000 Cubic Feet Daily Capacity.

The Newcastle Gas-Works Board of Conciliation.—The Board of Conciliation of the Newcastle and Gateshead Gas Company and their workmen, met yesterday week at the offices of the Company, under the presidency of Alderman Lucas, who officiated as Referee. An application was made by representatives of the barrow-men and other employees for an advance of wages. After discussion, the matter was finally settled in a compromise, approved of by the Referee, in which about one-third of the sum originally demanded was allowed, or 3½d. per shift advance.

New Reservoir at the Ashford Water-Works.—The new reservoir which has been constructed by Mr. W. J. Logan, of Maidstone, for the Ashford Water Company, at a cost of £3350, is now completed. It is in two compartments, which are capable of holding from 140,000 to 150,000 gallons. The inside area of each is 47 ft. 6 in. by 40 feet; the depth being 13 feet. The floor is composed of concrete 3 ft. 6 in. thick; the walls having a thickness of 5 ft. 3 in.; and the wall dividing the compartments being 4 ft. 9 in. thick. The roof is supported by rolled steel girders, with two rows of longitudinal piers. The tower, which is intended for use in connection with the high service, is 60 feet high, and is built of Faversham stock bricks, with local red brick piers. It contains a tank, the capacity of which is 2500 gallons. By means of the new arrangements, a great improvement will be effected in the service in the higher districts. While the old reservoir only contained four hours' supply of water for the whole town, the new one is capable of holding sufficient for three days in winter and two days in summer.

A Joint Water Board for Heywood and Middleton.—The Water Committee of the Heywood Corporation have recently had a conference with representatives of the Middleton Corporation regarding a proposal to form a Joint Board for the management of the water system (now controlled by Heywood) which supplies the two towns and other districts with water. They decided to carry out the scheme; and the necessary arrangements have been settled. The Board is to consist of twelve members—six from Heywood and six from Middleton; and the two Corporations are to become joint owners of the undertaking, to be equally entitled to the assets, and equally responsible also for the liabilities. The current rates are to be continued for water; and from the surplus revenues of the undertaking, Heywood is to receive £25,000 towards the deficiencies met in past years by the town since the purchase of the undertaking in 1877. A report on the subject was presented at the meeting of the Heywood Town Council on Thursday. Mr. Sutcliffe Firth proposed its adoption. He remarked that it was only reasonable for Middleton to have a voice in the direction of an undertaking in which they had as great a share as Heywood. The motion was carried.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., on Monday last week, Mr. Alfred Richards sold, by order of the Directors of the Plymouth Gas Company, £10,000 of ordinary stock of the Company, the present dividend on which is 6½ per cent., at an average of £152 3s. 11d. per £100; yielding £4 0s. 5d. per cent. on the investment. A new issue of £10 shares in the Hayward's Heath Gas Company, bearing £8 1s. per cent. dividend, was disposed of at an average of £18 13s. 1d. per share; yielding £4 6s. 3d. per cent. A new issue of 5 per cent. perpetual debenture stock of the Epsom and Ewell Gas Company was sold at the rate of £148 per £100; returning £3 7s. 7d. per cent. Some "C" capital stock of the Watford Gas Company, bearing 10 per cent. dividend, was purchased at an average of £247 17s. 1d. per £100; yielding £4 0s. 7d. per cent. On Wednesday, Messrs. Fox and Bousfield sold at the same place original £10 shares in the North Middlesex Gas Company at £25, and ordinary shares of the same nominal value at £17 10s. to £17 15s. each; also some £5 shares in the Cobham Gas Company at £5 10s. each. At a sale at Grimsby the same day, the following stock and shares were disposed of: £65 of "B" stock in the Grimsby Gas Company, which realized £146; while £110 of "C" stock fetched £246. Thirty £10 fully-paid shares in the Grimsby Water Company produced £28 5s. each; ten shares of £10 each, £8 paid, sold for £23 each; and five similar shares, for £23 10s. each. For five new shares of £10 each in the Cleethorpes Gas Company £16 5s. each was paid. The following day, at Brighton, £120 of original stock of the Brighton and Hove Gas Company was put up for sale in £40 lots, which were purchased for £140 each.

The Amalgamation of Incandescent Gas-Light Companies.—The scheme of amalgamation of the several Welsbach Incandescent Gas-Light Companies was advanced another stage yesterday. Meetings of the shareholders were held to consider two resolutions. The first had for its object the modification of clause 155 of the Articles of Association, and the addition to it of a proviso that, where shares "cannot be distributed in accordance with the rights of the contributories without fractional allotments of some of such shares, the Liquidators may adjust the rights by selling the shares which in strictness should be allotted in fractions, and substituting the net proceeds for the fractions, or may allot a whole share to a contributory entitled to a fraction, and in such case make a corresponding reduction in the cash payment to be made to such contributory, and may in the alternative pay to any contributory entitled to a fractional allotment an extra sum of cash in lieu thereof." The second resolution appointed Mr. E. Hayes, of 14, Palmer Street, Westminster, and Mr. W. H. Gillett, of 39, Threadneedle Street, Liquidators for the purpose of winding up the Companies. At the meeting of the English Incandescent Gas-Share Company, Major-General Beresford, who presided, said the shareholders would probably remember that, at the meeting of the Company held in November last, they gave the Directors a mandate to carry into effect certain arrangements for the purpose of bringing about an amalgamation of the Company with the Welsbach Incandescent Gas-Light Company, Limited, under which arrangement the latter were to purchase the Company and certain other Incandescent Companies. He was happy to say that the shareholders' wishes had been given effect to; and they had now arrived at the final stage, which was to formally complete the amalgamation. It might appear to the shareholders that the time taken to carry out the arrangements had been unnecessarily long. But he could assure them that it was not so; and it would have been humanly impossible to have brought it about in less time than they had taken. The resolutions were agreed to. Meetings of the other Companies were subsequently held.

RICHMOND'S

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FOR NAMES OF PRIZE WINNERS

SEE PAGE 615.

So much interest has been shown in this Novel Competition that we have decided to issue a SPECIAL SUPPLEMENT in connection with it, which will be published shortly.

RICHMOND & CO., Ltd.

Gas-Stove Manufacturers,

WARRINGTON, STRATFORD, & LONDON.

CITY SHOW-ROOMS: 132, QUEEN VICTORIA STREET, E.C.

Corporation Workmen's Dinner in Leeds.—The annual dinner of the employees of the Leeds Corporation Gas Meter and Stove Department was held on Saturday, the 5th inst. The Chairman of the Workshops Committee (Mr. H. Scholefield) was present and addressed the men, as did also the Superintendent of the Workshops (Mr. J. Templeton). "The health of Mr. Templeton and success to the workshops" was proposed and cordially received. A number of songs and recitations were contributed, and an enjoyable evening was spent.

The Proposed Sale of the Todmorden Water-Works to the Rochdale Corporation.—The shareholders of the Todmorden Water Company have passed a resolution confirming the agreement to sell their undertaking to the Rochdale Corporation. In the course of the discussion, some of the shareholders complained that, after waiting for so many years without a dividend, they ought to have obtained a much better price for the works, considering the position the Company had attained; but those who had threatened opposition to the resolution did not vote either way.

The Loss of the Newhaven and Seaford Water Board Bill.—It has already been announced that the Bill promoted by the Newhaven and Seaford District Councils failed to comply with Standing Orders; and the Lords' Committee declined to suspend them to allow the Bill to go forward. The two principal grounds were that the notice did not make it plain that any deficiency in the revenue of the proposed Water Board was to be contributed to by the Rural District Council. Special importance was attached to the signature of a memorial by a member of the Council, and the fact that the Borough Fund Act, 1872, had not been complied with. It has been decided that the Act does not apply to Rural District Councils who are held not to be "governing bodies" within its meaning. The other point was the omission of the words "Arbitration Act, 1889," in the clause of the notice referring to compulsory purchase. It appears that steps are being taken to have a purchase clause inserted in the Bill of the Newhaven and Seaford Water Company's Bill.

Reductions in Price.—As from the 1st prox., the price of gas at Hertford will be 3s. 11d. per 1000 cubic feet, instead of 4s. 2d. and 4s. as hitherto; and prepayment meter consumers will get an additional 2 cubic feet for 1d. The Cirencester Gas Company, Limited, have given notice of their intention to reduce the price of gas, as from the 31st inst., to 3s. 9d. per 1000 cubic feet, with 5 per cent. discount for cash in two months, and an extra discount of 10 per cent. for gas used for cooking and motive power. The Newcastle (Staffs.) Town Council have reduced the price of gas to 2s. 10d. per 1000 cubic feet, with a discount of 5 per cent. if paid within a month; the new arrangement to come into operation after the present quarter. The Havant Gas Company announce a reduction from 4s. 2d. to 4s. per 1000 cubic feet.

Portsmouth Water Company and the Corporation.—The relations between the Portsmouth Corporation and the Water Company, which have of late not been very amicable, are now more satisfactory. The Company, as already notified in the "JOURNAL," are applying for a Provisional Order to enable them to raise further capital and to acquire certain lands for the protection of their sources of supply; and there was some probability of the application being opposed by the Corporation. The points at issue were recently considered at a conference between the Water Committee of the Corporation and the Directors of the Company, with the result that the latter propose to issue the new capital at 5 instead of 7 per cent., and to offer it to public competition. It seems that the Directors are further prepared to issue debentures at 3 instead of 5 per cent.; and the assurance they have given to the Committee that the money is to be devoted to the prevention of the danger of pollution of the water is considered to be satisfactory to the Corporation. The Directors are taking steps to facilitate the drainage of Havant, where their sources of supply are located, and have applied to the Committee to co-operate with them in this work. The Committee feel that they cannot act with the Company in a joint petition to the Local Government Board; but they think that the Council should be asked to forward a separate memorial in support of the Directors' petition.

The gross profit available for distribution for the past year's operations of Messrs. John Wright and Co., Limited, amounts to £17,457. With this it is proposed to pay the interest on the 6 per cent. preference shares for the half year, which will absorb £1740; a 10 per cent. dividend on the ordinary shares, £3000; to pay a bonus of 5s. per share on the ordinary shares, £3000; place to reserve, £5000; and carry forward, £4717.

By an announcement which appears below, it will be seen that the Directors of the Crowborough District Water Company, which was incorporated by an Act obtained last session are about to issue the balance—£23,640—of the authorized capital of £30,000, in £10 shares; a sum of £6360 having been privately subscribed. The shares rank for a dividend up to 10 per cent. The works, which are situated in Rotherfield, are in progress; and a well already sunk to a depth of 50 feet yields 250,000 gallons of water every 24 hours. The locality to be served is a few miles south-west of Tunbridge Wells, and is regarded by physicians as a good health resort. The only requirement to further develop it appears to be a first-class water supply. The subscription list will open on Thursday, and close on the 21st inst.

An exhibition of gas cooking ranges and gas-fires, promoted by the Bristol Gas Company, was held at Montpelier last week. The collection consisted entirely of the manufactures of Messrs. Fletcher, Russell, and Co., Limited. The cookery lectures were delivered by Miss Rose Brown. Messrs. Richmond and Co., Limited, have lately held a successful exhibition of gas cooking and heating appliances at Tonbridge; and from Tuesday to Saturday of last week their appliances were on view in the Volunteer Hall, Selkirk. Mrs. J. J. Middleton gave lectures on cookery. Messrs. W. Parkinson and Co. held a successful gas exhibition, under the patronage of the Manchester Corporation Gas Department, in the Gaskell Hall, Longsight, Manchester, from Tuesday to Friday last week. Practical lessons on cookery were given by Miss E. Sanderson. A gas exhibition under the auspices of the Gas Department of the Corporation of Sandwich was opened by the Mayor (Alderman W. J. Hughes) in the Drill Hall on Monday last week. Gas-stoves and other appliances were exhibited by Messrs. Richmond and Co.; and lectures on cookery were given by Miss A. Stansfield.

THE CROWBOROUGH DISTRICT WATER COMPANY.

Incorporated by the Crowborough District Water Act, 1897.

ISSUE OF 2364 ORDINARY SHARES OF £10 EACH

(Balance of the Authorized Share Capital of £30,000), £6360 having been Privately Subscribed.

THE LIABILITY ON THE SHARES IS LIMITED.

Under Section 75 of the Water-Works Clauses Act, 1847, the Shares may rank for Dividends up to 10 per cent.

PRICE OF ISSUE PAR.

BANKERS: Messrs. BARCLAY & COMPANY, Limited, Union Bank, Brighton, 54, Lombard Street, London, E.C., and Branches.
The List will open on Thursday, March 17, and will close on or before Monday, March 21, 1898.
PAYMENTS—On Application 40 per cent.; Three months after Allotment 10 per cent.; and the Balance in calls of not exceeding 20 per cent. at intervals of not less than three months.

The Crowborough District Water Act, 1897, which received the Royal Assent on the 15th day of July, 1897, incorporated the Company and empowered them to construct water-works, as follows:—

Section 5: The limits of this Act for the supply of water (hereinafter referred to as "the limits of this Act") shall be so much of the parishes of Rotherfield and Withyham, in the County of Sussex, as lies south of a line drawn due west from the point where the main road from Tunbridge Wells to Crowborough enters the Parish of Rotherfield at or near Eridge Green, and so much of the Parish of Buxted, in the said County of Sussex, as lies north of a line drawn due west from the point of junction of the boundaries of the Parishes of Rotherfield, Buxted, and Mayfield, at or near Little Forge.

Section 25: Subject to the provisions of this Act, the Company may make and maintain, in the lines and situations and according to the levels shown on the deposited plans and sections, the water-works hereinafter described, with all proper and necessary embankments, filtering-beds, drains, sluices, catchpits, conduits, culverts, channels, wells, cuts, adits, roads, approaches, telegraphs, telephones, and other means of electrical communication, standpipes and hydraulic rams, for high-level service, and other apparatus, engines, works and conveniences connected with the said works, or any of them or incidental thereto, or necessary or convenient for inspecting, maintaining, cleansing, repairing, conducting or managing the same, and may enter upon, take and use such of the lands delineated on the deposited plans and described in the deposited book of reference as may be required for that purpose.

Under a contract entered into by the Company on March 2nd, 1898 the construction of the high and low service reservoirs, water tower, and pumping-station and the laying of the necessary mains, all of which are situate in the Parish of Rotherfield, in the County of Sussex, are being proceeded with.

The Company are authorized under their Act to construct an impounding reservoir, with a pumping station and filter-beds, to be situate upon or across the stream flowing down from Crowborough to Jarvis Brook, to be formed by a dam or weir across the said stream, situate at a point 800 yards or thereabouts, measured in a north-westerly direction, from the bridge carrying the railway from Uckfield to Tunbridge Wells, over the road from Crowborough to Rotherfield, at or near Crowborough Station.

In addition to, or possibly in substitution for, the impounding reservoir above mentioned, use will be made of a good underground supply, which has been already obtained from a well sunk in a most convenient position at Maynard's Gate (on the main road from Crowborough Station to Rotherfield, and with easy access to the Railway Station), where the pumping-station will now be placed.

The well above referred to has been sunk to a depth of over 50 feet, **and now yields a quarter of a million gallons of water every 24 hours.**

The Freehold Land at present required for the Undertaking has been acquired by agreement between the Marquess of Abergavenny and the Company, dated the 30th day of December, 1897.

A copy from the Ordnance Survey is enclosed with the Prospectus, showing the position of the pumping-station, Company's offices, high and low service reservoirs, water-tower, mains, &c., which it is proposed to construct.

Crowborough is situated 7 miles south-west of Tunbridge Wells and about 19 miles from Lewes and 28 miles from Brighton. The station is on the L. B. & S. C. Railway.

Crowborough Beacon, being situated 800 feet above sea-level, is very highly recommended by physicians and others as a health resort, the air being particularly dry and bracing. It has the advantage, owing to its elevated position, of possessing some of the most beautiful views in the South of England. In one direction Eastbourne can be seen many miles distant, and various other points of the coast. Then, as to its inland scenery, a view of the heart of Sussex and the whole range of the South Downs right away to Hampshire, and Westward along the centre of the Ashdown Forest to the Dorking Hills, is obtained. The locality is not only picturesque, but bears a strong resemblance to Scotland, many of the hills being covered with heather, and is, therefore, a unique spot considering its short distance from London. The estates in the district are being developed for building purposes. During the last few years, many excellent houses have been erected, and a first-class water supply is only required to further develop the district, which it is thought by many will become a formidable rival to Tunbridge Wells as a health resort.

As an illustration of the present value of local water-works investments, it may be mentioned that the £5 Ordinary Shares of the Tonbridge Water-Works Company, Limited, are certified by the Secretary to stand at £11 per Share, or a Premium of 120 per cent.; while the Secretary of the Cranbrook District Water Company certifies that the £1 Ordinary Shares in that Company have recently changed hands at a premium of from 20 to 25 per cent., and that on a recent issue of debentures part realized £128 11s. 6d. for each £100 debenture, or a premium of over 28 per cent.

A form of application for Shares is enclosed with the Prospectus. Where no allotment is made, the deposit will be returned in full; and in case of a partial allotment, the balance of the deposit will be applied towards the subsequent instalments. If default be made in payment of any instalment at its proper date, the deposit and instalments previously paid will be liable to forfeiture.

Prospectuses and Forms of Application may be obtained at the Company's offices; or of their Bankers, Messrs. Barclay & Company, Limited, Union Bank, Brighton; Head Office, 54, Lombard Street, E.C., and Branches; or of Messrs. Verrall & Borlase, Solicitors, 4 & 5, New Road, Brighton, at whose office the before-mentioned contract and agreement can be inspected.

Applications for Shares to be made on the form enclosed with the Prospectus, and forwarded to the Company's Bankers with the amount of deposit.

DIRECTORS:

F. MILLER, Esq., Director of the Barton-upon-Humber Water Company, and the Cranbrook District Water Company.

E. J. HOLMES, Esq., Director of the Cranbrook District Water Company.

S. DENNIS, Esq., Director of the Guernsey Water-Works Company, Limited.

BANKERS:—Messrs. BARCLAY & COMPANY, Limited, Union Bank, Brighton.

SOLICITORS:—Messrs. VERRALL & BORLASE, 4 & 5, New Road, Brighton.

ENGINEERS:—C. O. BLABER, Esq., C.E., and G. PERRYN, Esq., Assoc. M. Inst. C.E.

ANALYST:—OTTO HEHNER, Esq., Public Analyst for West Sussex.

COMPANY'S OFFICES: 4, TOKENHOUSE BUILDINGS, BANK OF ENGLAND, E.C.

Works: CROWBOROUGH, SUSSEX.

14th March, 1898.

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095. Holborn.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS;

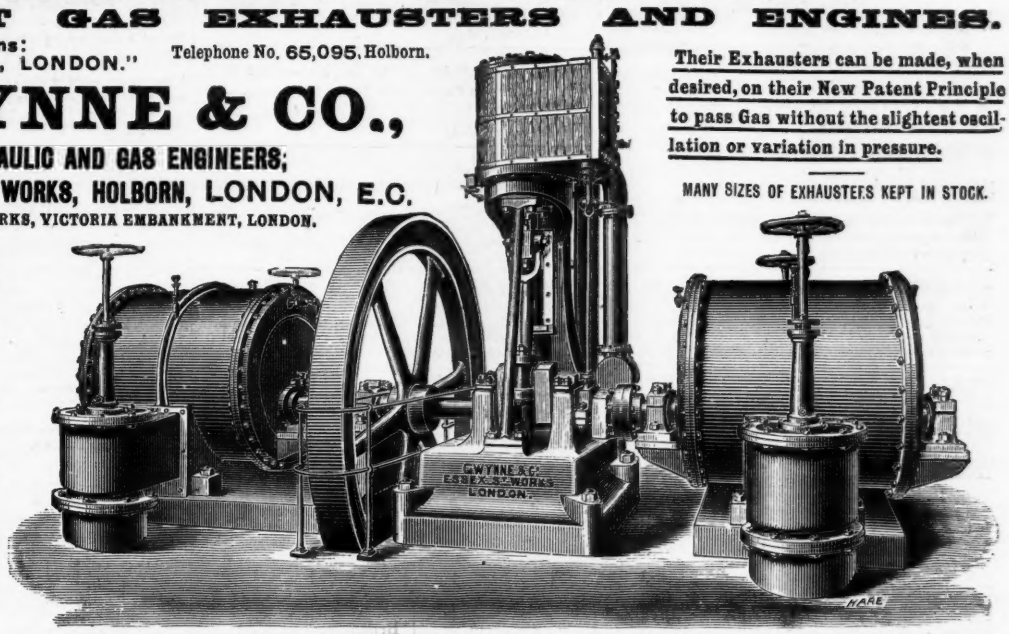
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 35,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see March 1, p. 506.]

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

Price 2s., Post Free.

STEPHEN CARPENTER, on the PURIFICATION OF COAL GAS BY LIME, OXIDE OF IRON, AND ATMOSPHERIC AIR, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality.
SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A 1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

TO GAS AND WATER COMPANIES, ENGINEERS, &c.

"WOODITE"—Superior substitute for Rubber, Asbestos, Leather, for Steam and Gas Joints, Rings, Washers, &c.
Write to JAMES READ, 27, Derby Rd., Croydon, SURREY.

ADVERTISER desires Engagement as DRAUGHTSMAN. Ten Years' Experience. Thoroughly and practically acquainted with Gas-Works Construction. Age 26.
Address No. 3017, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a steady experienced Man for SULPHATE of AMMONIA MAKING.
Apply to the MANAGER, Gas-Works, KEIGHLEY.

WANTED, an Exhauster Man, accustomed to Gas-Engine, to act as ASSISTANT FOREMAN of Coke-Ovens Gas-Recovery Plant.
State Experience and Salary required to W. ACKROYD BOWER, Whitewood Chemical Works, NORMANTON.

DRAUGHTSMAN wanted, by a Firm of Gas Engineers and Contractors in Yorkshire. One well up in getting out Detailed Drawings for Workshop Use preferred.
Apply, by letter, to No. 3016, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CLERK OF WORKS.

WANTED, a Gentleman, well up in Iron and Steel construction, with fair knowledge of Brick and Concrete Work. One accustomed to Gas-Works Plant preferred.
Address, stating Age, Qualifications, References, and Salary required, No. 3018, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a Small Gas-Works, a GAS MAKER who can do light Repairs, Service Laying, Meter Taking or Fixing. (One who can speak Welsh preferred.) Wages, 25s. per week, with House, Coal, and Gas free, and Garden in which he can grow his own Vegetables.
Applications, with recent Testimonials, to be sent to No. 3015, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

NEWCASTLE-ON-TYNE AND GATESHEAD GAS COMPANY.

THREE good Main Pipe Layers re- quired. Must be steady and reliable, able to write, and have had experience in laying Lead-Jointed Gas-Mains of 24 inches diameter or upwards.
Wages, £2 per week.
Apply, by letter, with *copies only* of Testimonials, to the undersigned.
(Signed) W. DOIG GIBB,
Engineer.

EPPING GAS COMPANY LIMITED.

THE Directors are prepared to receive APPLICATIONS for the position of WORKING MANAGER.
Wages average 27s. 6d. per week, with good House, Garden, Coal, and Gas.
Applicants must be capable of attending to an Engine, laying Services, and directing and assisting in the construction and repairs of Works.
Applications must be sent addressed to me at Epping.
EDWARD ALLEN,
Secretary.

BOROUGH OF COLNE.

GAS ENGINEER AND MANAGER.

THE Corporation are open to receive APPLICATIONS for the appointment of GAS ENGINEER and MANAGER.
Gas Manufacture, 110 millions per annum.
Salary, £225 per annum.
Applications, stating Age, Qualifications, &c., together with three recent Testimonials, to be forwarded to the undersigned, marked "Gas Engineer," on or before the 21st inst.
ALFRED VARLEY,
Town Clerk.
Town Clerk's Office, Town Hall,
Colne, March 7, 1898.

WANTED, twenty-four 20 in. by 15 in. O-MOUTHPIECES, with Ascension and Bridge Pipes.
Price and Particulars to J. MACPHERSON, Gas-Works, Cupar, FIFE.

FOR SALE—12-inch Governor by Peebles. 42 4-inch White's ANTI DIP VALVES. No reasonable offer refused.
Apply to the MANAGER, Gas-Works, ILKESTON.

EIGHTY-LIGHT Dry Gas-Meter, by Alder and Mackay. Nearly new; £5 10s.
J. F. BLAKELEY, Ravensthorpe, YORKS.

PIPE Condensers, eight heights of 6-inch Pipes and bottom Box. £12.
Address No. 3009, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GASHOLDER and Iron Tank, 8500 cubic feet Capacity. Equal to new. Very Cheap.
Address No. 3011, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Exhauster, 20 to 25,000 cubic feet per hour, with Inlet and Outlet Valves and Connections. £30. By Donkin; splendid condition.
Address No. 3010, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, as a Going Concern—A small GAS-WORKS (Freehold Property) near the Eastern Coast.
The Works are in full working order; and there is a good Coal Business attached.
Apply, in first instance, to Mr. W. H MORGAN, Consulting Gas and Chemical Engineer, RHAYADER.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 6000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

FOR SALE, Cheap—The under- mentioned GAS PLANT:—

	Square.	Deep.			
	Ft. in.	Ft. in.			
2 PURIFIERS,	8 0	4 6	6-in.	Valves & Connections.	
1 "	7 6	4 6	6 "	"	"
2 "	5 0	4 0	4 "	"	"
1 "	5 0	2 9	4 "	"	"

C-I. SCRUBBER, 38ft. 6in. high, 6ft dia., 14-in. "
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's) 20,000 c.f. per hour 8-in. Valves
Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

CORPORATION OF ROTHERHAM,
(GAS DEPARTMENT.)

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the Painting of two Gasholders.
Particulars may be had on application to the undersigned, to whom Tenders, endorsed "Painting Gasholders," must be sent, on or before Monday, March 21, 1898.
FRANK A. WINSTANLEY,
Engineer.

CORPORATION OF ROTHERHAM,
(GAS DEPARTMENT.)

TESTING APPARATUS.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply and delivery of APPARATUS for the TESTING of COAL GAS.
Particulars may be had on application to the undersigned, to whom Tenders, endorsed "Testing Apparatus," must be sent, on or before Monday, March 21, 1898.
FRANK A. WINSTANLEY,
Engineer.

ULVERSTON URBAN DISTRICT COUNCIL.

OXIDE OF IRON.

THE Gas and Water Committee invite TENDERS, accompanied by Analysis, for the supply of 50 Tons of HYDRATED OXIDE OF IRON, delivered at the Ulverston Railway Station. Also for the purchase of about 100 Tons of SPENT PURIFYING MATERIAL.
Samples of the Fresh Material offered may be sent to, and samples of the Spent may be had on application to, the undersigned, from whom any further Information may be obtained.
Sealed Tenders, endorsed "Tender for Spent Oxide" or "New Oxide," must be delivered not later than the 31st inst., addressed to the Chairman of the Gas and Water Committee.
JNO. SWAN,
Engineer and Manager.

ULVERSTON URBAN DISTRICT COUNCIL.

B. O. V.

THE Gas and Water Committee invite TENDERS for the supply of B. O. V. made from Brimstone or Spent Oxide of a strength not less than 144° by Twaddell's Hydrometer, delivered at Ulverston Railway Station, during the Year ending the 31st of March, 1899. The Price to include the carriage of return empty Carboys.
Any further Information may be obtained on application to the undersigned.
Sealed Tenders, endorsed "Tender for B. O. V.," must be delivered not later than the 31st inst., addressed to the Chairman, Gas and Water Committee.
JNO. SWAN,
Engineer and Manager.

DEVONPORT GAS AND COKE COMPANY.

TENDERS FOR GAS COALS.

THE Directors of the Devonport Gas and Coke Company invite TENDERS for the supply of 16,000 Tons or 8000 Tons (at their option) of unscreened (through and through) NEWCASTLE or DURHAM GAS COALS, to be shipped, in such quantities and at such times as may be required, between the 1st of July, 1898, and the 30th of June, 1899.
The Cargoes to be discharged at the Tamar Wharf, Devonport.
Tenders may be quoted either c.i.f. or f.o.b. (but c.i.f. preferred), endorsed "Tender for Coals," addressed to the Chairman, Devonport Gas and Coke Company, Devonport.
Tenders to be sent in on or before Monday, the 21st of March next.
Devonport, March 8, 1898.

WINDSOR ROYAL GASLIGHT COMPANY.

THE Directors invite Tenders for the supply and erection of a GAS PURIFIER 20 feet by 14 feet by 4 ft. 9 in. deep, with Foundations, Brickwork, Woodwork, &c.
Drawings and Specification may be seen and copied, between the hours of Nine a.m. and Five p.m. at the Offices of the Company, 15, Victoria Street, Windsor.
Tenders, endorsed "Tender for Purifier," &c., and addressed to the Secretary, on or before Monday, April 4, 1898.
The Directors do not bind themselves to accept the lowest or any Tender.
March 14, 1898.

MORECAMBE GAS AND LIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 6000 Tons per annum of screened GAS COAL, to be delivered on the Gas-Works Siding, Midland Railway, Morecambe, in such quantities as may be required during a period of One, Two, or Three Years.
Tenders, specifying the description of Coal, the name of the Pit at which it is raised, and the terms for net monthly payments, are to be sent in on or before Friday, the 18th of March, 1898, endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any Tender.
WILLIAM DUFF,
Secretary and Manager.
Market Street, Morecambe,
March 2, 1898.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

TENDERS FOR SULPHURIC ACID.

THE Gas Committee invite Tenders for the supply of about 1400 Tons of SULPHURIC ACID, to be delivered during the Twelve Months from date of acceptance of Tender.
Full Particulars may be obtained from the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Acid," addressed to the Chairman of the Gas Committee, to be delivered to me not later than Three p.m., on Thursday, March 24, 1898.
By order,
SAML. BROWN,
Town Clerk.
Town Hall, Salford,
March 12, 1898.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

TENDERS FOR LIME.

THE Gas Committee invite Tenders for the supply of LIME required in the Purification of Gas at their respective Works during the Twelve Months from date of acceptance of Tender.
Total quantity required, about 1100 Tons.
Full Particulars may be obtained from the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Lime," addressed to the Chairman of the Gas Committee, to be delivered to me not later than Three p.m., on Thursday, March 24, 1898.
By order,
SAML. BROWN,
Town Clerk.
Town Hall, Salford,
March 12, 1898.

COUNTY BOROUGH OF BURNLEY.

GAS AND OTHER COALS.

THE Corporation of Burnley are pre- pared to receive TENDERS for the supply for One, Two, or Three Years of 4000 Tons of CANNEL per annum, and of such quantity of GAS COAL as may be required (approximately estimated at 48,000 Tons per annum), to be delivered in such quantities and at such times as the Gas Engineer of the Corporation may from time to time require.
TENDERS are also invited for the supply of HOUSE and STEAM COAL to the various Departments of the Corporation.
Printed Forms of Tender and Conditions of Contract may be obtained on application to Mr. J. P. Leather, Gas Engineer, Gas-Works, Burnley.
Tenders, which must be on the printed form, and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, marked "Tender for Gas Coal," or "Tender for House and Steam Coal," as the case may be, must be delivered not later than Wednesday, the 30th inst.
By order,
WM. T. FULLALOVE,
Town Clerk.
Town Hall, Burnley,
March 8, 1898.

COUNTY BOROUGH OF BURNLEY.

TO TAR DISTILLERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works during the period of Twelve Months ending March 31, 1899.
The Tar will be delivered by the Corporation into Boats provided by the purchaser at the Gas-Works Wharf on the Leeds and Liverpool Canal.
Tenders, under seal, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Town Hall, Burnley, to be delivered not later than Wednesday, the 30th of March, 1898.
JNO. P. LEATHER.
Gas-Works, Burnley,
March 10, 1898.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the supply of GAS COAL.

Specification and Form of Tender may be obtained on application to the undersigned, or at the Gas Offices.

Tenders to be sent in not later than Twelve o'clock noon, the 24th of March, 1898, addressed to the Mayor (F. Geen, Esq., J.P.), Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

WM. PRINCE,
Engineer and Manager.

Gas-Works, Stoke-upon-Trent.

BALLYMENA AND HARRYVILLE GASLIGHT COMPANY, LIMITED.

THE Ballymena and Harryville Gaslight Company, Limited, invite TENDERS for 1700 Tons of best screened GAS COAL, free on Waggons at Larne Harbour, to be delivered before the 1st of November next.

Payment to be made on the first Thursday in March, 1899.

Tenders to be lodged with me on or before the 24th of March, 1898.

THOMAS C. C. HOOD,
Secretary.

Ballymena, March 12, 1898.

BOROUGH OF DARWEN.

GAS-GOVERNORS.

THE Corporation are prepared to receive TENDERS for the supply of Two 20-inch GAS-GOVERNORS, with Connections and Valves complete

Plan and Particulars may be obtained from the Engineer and Manager, Mr. A. H. Smith, Gas-Works, Darwen.

Tenders to be addressed to the undersigned, endorsed "Gas Governors," and delivered at my Office not later than Wednesday, the 16th day of March.

No Tender necessarily accepted.

By order,
CHAS. COSTEKER,
Town Clerk.

Town Clerk's Offices, Darwen.

CORPORATION OF BANGOR.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and erection of a TWO-LIFT HOLDER, in their present Tank. The Tank being of Cast-Iron, 62 feet diameter by 14 feet deep, the side is to be raised to 23 feet. Also for a WASHER-SCRUBBER, equal to a make of 1 million cubic feet of Gas per day.

Further Particulars may be had, and Plans and Specification of Holder and Tank seen, on application to the undersigned, on and after Thursday, the 17th inst.

Tenders, addressed to the Chairman of Committee, to be sent in not later than Thursday, the 24th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

JOHN SMITH,
Manager.

Bangor, March 12, 1898.

IRON BRIDGE GAS LIGHT COMPANY LIMITED.

TENDERS FOR RETORT-SETTINGS, HYDRAULIC MAIN, &c.

THE Directors of the above Company invite TENDERS for the supply of Material and erection of FOUR SETTINGS OF RETORTS on the Generator Principle, together with HYDRAULIC and FOUL MAINS and all IRONWORK. The Contract will also include the REMOVAL OF OLD BEDS.

Plans and Specification may be seen at the Company's Offices as under, and further Information may be obtained from Mr. William Belton, Gas-Works, Shrewsbury.

Tenders, marked "Tender for Retort-Settings," must be received not later than Friday, March 25 next.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED H. THORN,
Secretary.

Gas Offices, Iron Bridge,
Shropshire, March 12, 1898.

BOROUGH OF DROITWICH.

GAS-WORKS EXTENSION.

TENDERS are invited for the Erection of BUILDINGS, PLANT, &c., as follows:—

CONTRACT No. 1.—For the erection of new RETORT-HOUSE, MANAGER'S HOUSE, and other BUILDINGS.

CONTRACT No. 2.—For the erection of a RETORT-STACK containing Three Beds of Retorts—viz., Eight, Six, and Four respectively, with REGENERATIVE FURNACES, together with SELF-SEALING MOUTHPIECES, ASCENSION-PIPES, HYDRAULIC MAIN, and IRONWORK complete.

CONTRACT No. 3.—For the supply and erection of IRON ROOF to Retort-House, STEAM-BOILER, PURIFIERS, and necessary CONNECTIONS.

Plans may be seen, and Copies of Specifications obtained (on payment of a fee of 10s. 6d. each, which will be returned on receipt of a *bonâ-fide* Tender), on application to the Gas Manager, Mr. A. T. Harris.

Sealed Tenders, endorsed "Tender for Gas-Works Extension," Contract No. 1, 2, or 3 respectively, to be delivered to the undersigned not later than Five p.m., on Tuesday, the 5th of April next.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order of the Fire and Lighting Committee,
S. JOHN TOMBS,
Town Clerk.

Town Hall, Droitwich,
March 3, 1898.

RESULT OF
Richmond's "Motto" Competition

[See Advt. on p. 611].

AWARDS.

FIRST PRIZE:—

1 "Model" Cooker No. 100, £6 10s.
1 1485 "Dragon" Gas-Fire £3 0s.
20s. Enamelled Utensils £1 0s. } **£10 10s.**

F. SMALL, 34, Alwyn Street, St. Michaels, Liverpool.

SECOND PRIZE:—

1 "Model" Cooker, No. 100, Enamelled. } **£6 10s.**

R. SANDELL, 56, Second Avenue, Manor Park, Essex.

THIRD PRIZE:—

1 No. 1485 "Dragon" Gas-Fire, Tiled. } **£3 0s.**

Mrs. LUCY CAMPBELL, 65, Comyn Road, Clapham Junction, S.W.

SEVEN PRIZES OF "SUNSHINE" HEATING-STOVES, Value £1 1s. each.

J. B. LOWE, 106, Hurlingham Road, Fulham, S.W.
JAMES BLACK, Gas-Works, North Berwick.
Mrs. JENNIE LEES, 4, The Terrace, Tonbridge.
J. HAZEL, 31, Victoria Street, West Bromwich.
H. YOUNG, 88, Richmond Road, Paddington, W.
A. S. FARBOROUGH, 27, Lidyard Road, Archway Road, N.
R. FISH, Newport Villa, York Avenue, East Cowes.

THIRTY PRIZES OF "RICHMOND" COOKERY BOOKS.

W. HALLEBON, Newark House, Eastbourne.
F. W. ALLANSON, 57, Tramway Street, Chapeltown Road, Leeds.
G. W. LAWSON, 7, Tennis Court Road, Cambridge.
Mrs. SADLER, Bryn Mor, Herbert Terrace, Alexandra Road, Plymouth.
W. WHITEHEAD, 3, Springs Road, Middleton Junction.
— FENDICK, Gas Manager, Boxmoor, Herts.
JOE SYKES, 62, Bentley Street, Huddersfield.
J. H. PECKETT, 62, Olive Grove, Southport.
Mrs. HOLLIDAY, 7, Belgrave Crescent, Scarborough.
H. WILLSMER, 46, Buckington Road, Kilburn, N.W.
W. DRANE, 121, Bennerley Road, Wandsworth Common, S.W.
T. D. OVERING, 35, Arbury Road, Nuneaton.
Miss MARGARET BELL, 1, Milton Street, Newcastle-on-Tyne.
C. SADLER, Ironmonger, 419, Oxford Street, Manchester.
P. F. ROBERTSON, 34, St. Phillips Road, Heigham, Norwich.
Mrs. CHAMPTION, 9, Chapel Road, Worthing.
W. PORRITT, Walker Street, Earlsheaton, Dewsbury.
W. A. REID, Great Water Street, Longford, Ireland.
WALTER R. WILSON (pupil to T. N. Ritson, Esq.), Gas-Works, Kendal.
Miss MAUD BROWING, Oxford House, Whitstable.
EDGAR H. MARTIN, Northdene, New Barnet.
J. HAMMOND (no address given).
WM. RUSSELL, 83, Gibbon Road, Kingston-on-Thames.
J. DALE, 24, Oakfield Road, Altrincham, Cheshire.
JOHN E. GILL, Gas-Works, Accrington.
EDGAR V. BARWOOD, 45, West Street, Leytonstone, E.
J. D. BRYOM, 6, Trimdon Street, West Hartlepool.
Miss SARAH L. THOMSON, Gas-Works, Inverness.
Mr. A. GIBSON, Mill Street, Birstall, Yorks.
Mrs. J. B. STONE, Gas-Works, Shepton Mallett.

(Signed) G. E. RICHMOND,
B.A., B.Sc., M.B., B.S. Lond., &c.

March 14, 1898.

Prize winners are requested to make application for their Prizes, signed in a similar manner to the Competition Form.

RICHMOND & CO., LTD.,
GAS APPARATUS MANUFACTURERS,
LONDON, WARRINGTON, & STRATFORD.
LONDON OFFICES: 132, QUEEN VICTORIA STREET, E.C.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ASSEMBLY of Proprietors will be held at the Company's Offices, St. Helen's Place, Bishopsgate, E.C., on Thursday, the 7th of April, 1898, at Twelve o'clock noon precisely, pursuant to Act of Parliament.

The Transfer Books in respect of the ORDINARY STOCK WILL BE CLOSED on the 24th of March, and RE-OPENED on the 4th of April, on which day the Dividends on this Stock will be payable.

By order,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place, E.C.,
March 10, 1898.

NOTICE is Hereby Given, that the PARTNERSHIP lately subsisting between us the undersigned Mary Ann Orme, Daniel Orme, and Francis Heans Orme, in the business of Gas-Meter Manufacturers, Brassfounders, and Brass Finishers, at the Atlas Meter Works, in Oldham, in the County of Lancaster, under the style or firm of GEORGE ORME AND CO., HAS BEEN DISSOLVED as and from the 31st day of March, 1897. All Debts now due to, and owing by, the said late Firm will be received and paid respectively by Meters Limited, who now carry on the said Business.

Dated this 14th day of February, 1898.

Witness to the Signatures of all Parties
J. CARLILE,
Solicitor, Oldham.

MARY A. ORME,
DANIEL ORME,
FRANCIS HEANS ORME.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY.

650 £10 SHARES
Ranking for a Standard Dividend of 7 per cent.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Wednesday, March 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
2500 SHARES IN THE
WEST HAM GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, March 29, at Two o'clock, in Lots, 2500 £10 (fully-paid) SHARES in the above Undertaking, to be issued under the Provisions of the West Ham Gas Act, 1889; the Dividends on these Shares rising or falling according to the Price charged for Gas. The last Dividend on the Company's £10 Shares was at the rate of 7 per cent. per annum.

Particulars of the SECRETARY of the Company, at the Offices, STRATFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HORNSEY GAS COMPANY,
and the Directors of the
MAIDSTONE GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Monday, April 4, at Two o'clock, in Lots:

HORNSEY GAS COMPANY—£5000 FIVE PER CENT. PREFERENCE STOCK.

MAIDSTONE GAS COMPANY—£6000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SALE OF NEWPORT (MON.) GAS SHARES.

(UNDER THE PROVISIONS OF THE COMPANY'S ACT, 1833.)

MR. THOMAS PARRY has received Instructions from the Directors to SELL BY PUBLIC AUCTION, at the

KING'S HEAD HOTEL, NEWPORT, MON.,

on

WEDNESDAY, THE 30th DAY OF MARCH, 1898,

At Three o'clock in the Afternoon,

SIXTY CLASS "C" SHARES OF £100,

IN LOTS OF ONE SHARE EACH.

THE STATUTORY DIVIDEND IS 7 PER CENT. PER ANNUM.

Particulars and Conditions may be had on application to the AUCTIONEER, Albany Chambers, NEWPORT, or to

MR. EDWARD F. MARFLEET,
Secretary,
at the Offices of the Company, NEWPORT, MON.

Dated 25th February, 1898.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 23rd inst., at Half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 12th, and RE-OPENED on the 24th inst.

By order of the Court of Directors,
H. B. CHAMBERLAIN,
Secretary.

Chief Office: No. 11, George Yard, Lombard Street, London, E.C.,
March 4, 1898.

HORNSEY GAS COMPANY.

SALE BY AUCTION OF £5000 £5 PER CENT. PREFERENCE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY AUCTION at the Mart, Tokenhouse Yard, London, on the 4th day of April next, £5000 of £5 PER CENT. PREFERENCE STOCK, in accordance with the Provisions of the Hornsey Gas Order, 1884.

The Stock must be paid up in full on or before the 18th day of April, after which date Interest will commence to accrue on such Stock, to be payable with the Dividends on the Ordinary Stock of the Company immediately after the Half-Yearly Meetings, usually held in February and August of each Year.

Particulars and Conditions of Sale may be obtained on application at the Offices of the Company, 63, Chancery Lane, London, W.C., or of Mr. Alfred Richards, Auctioneer, 18, Finsbury Circus, London.

By order,
S. J. WILLIAMS,
Secretary.

Offices: 63, Chancery Lane, London, W.C., March 5, 1898.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc M.Inst.C.E., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day. Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS.
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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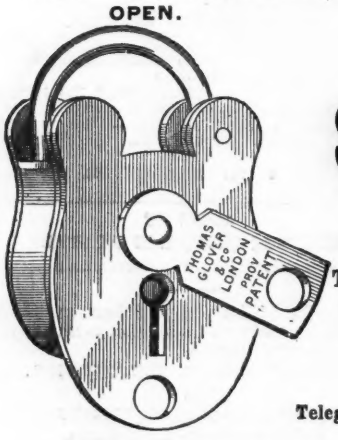

THOMAS GLOVER & CO.'S

PATENT

SECURE PADLOCK

Prevents Tampering with the
CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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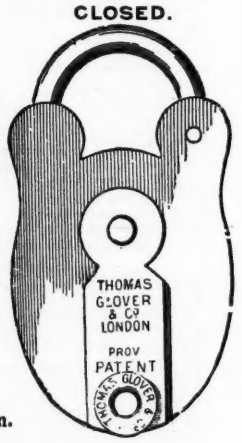

Telegraphic Address: "GOTHIC LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 1005

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."*

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address: "GASMAIN."* Telephone No. 1525 South Side.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS, STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD ST., E.C.

Telephone: Castleford No. 214. | Postal Address: Castleford.

Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, LTD.

ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel.

Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.

CHESTERFIELD.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England, and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES, NEWCASTLE-UPON-TYNE.

WATERBLEAN PAINT

TELEGRAMS: "EVESON, BIRMINGHAM."

EVESON FOR CANNEL

TUBES AND FITTINGS

ALL KINDS

WRITE FOR PRICES

STAFFORDSHIRE TUBE Co., BIRMINGHAM.

ALEXANDER CAMERON,

GAS AND CANNEL COAL MERCHANT,

48, WEST REGENT STREET,

GLASGOW.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,

THE HARTON COAL CO., LTD.,

NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., LD.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500	Cub. Ft.
Illuminating Power	16·9	Candles.
Coke (of good quality)	67·5	per Cent.
Sulphur	0·58	,,
Ash	2·78	,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., LD.

QUAYSIDE, NEWCASTLE-ON-TYNE.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,

3 Lombard Street, NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE:

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY,

Manufacturers of MACHINE-MADE RETORTS and

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.

WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.

For Prices and Analysis, apply as above.

OIL FOR GAS MAKING

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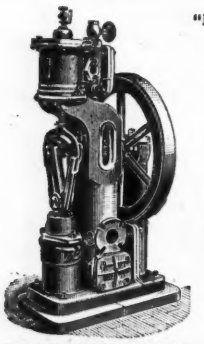

Fig. 705. "SINGLE RAM" STEAM-PUMP.

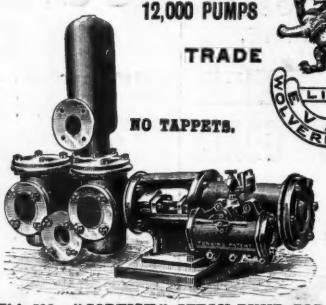

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

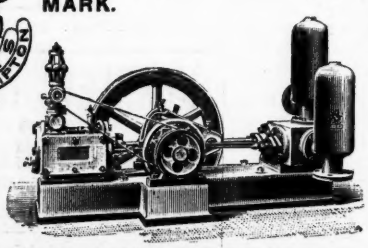

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

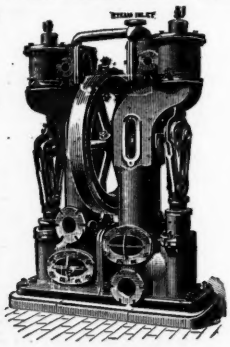

Fig. 712 "DOUBLE-RAM" TEAM-PUMP.

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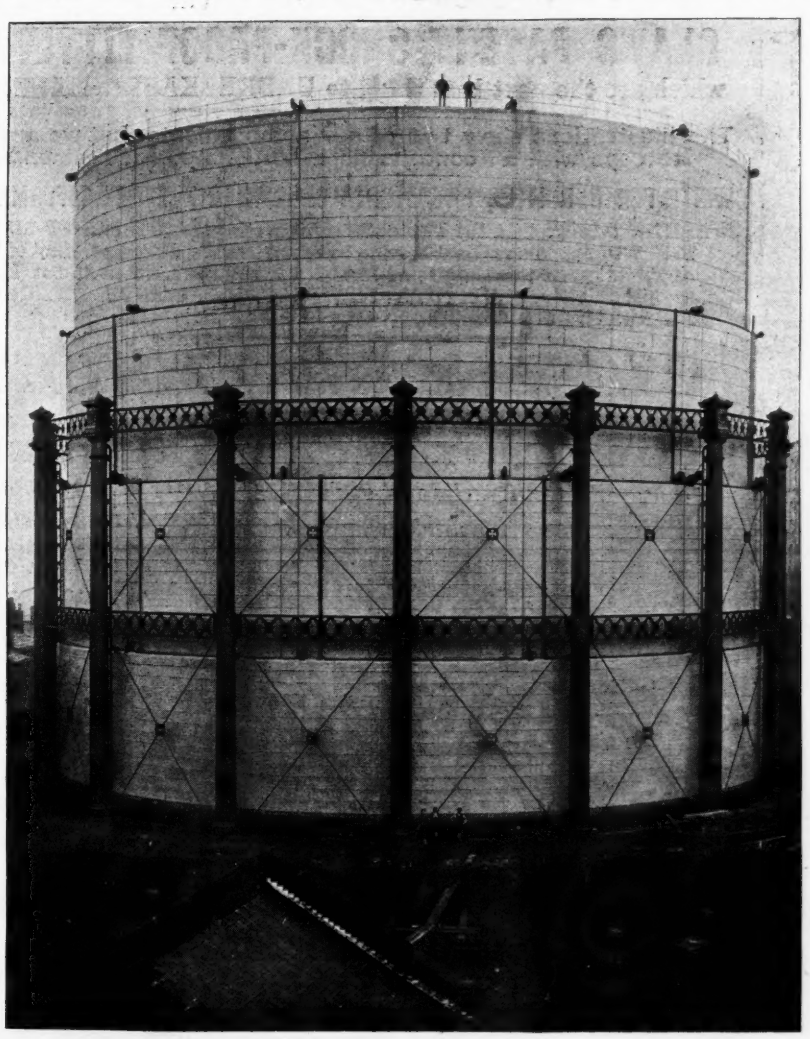

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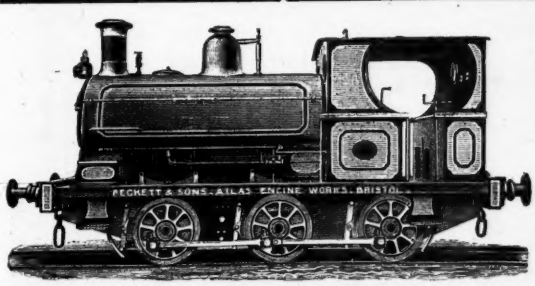

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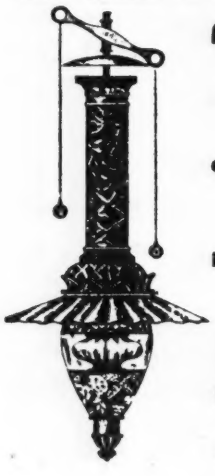

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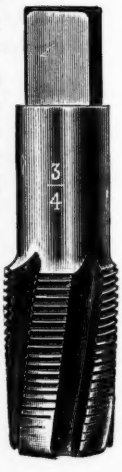

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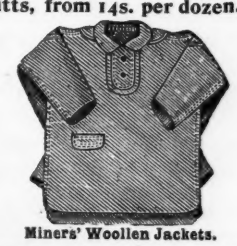
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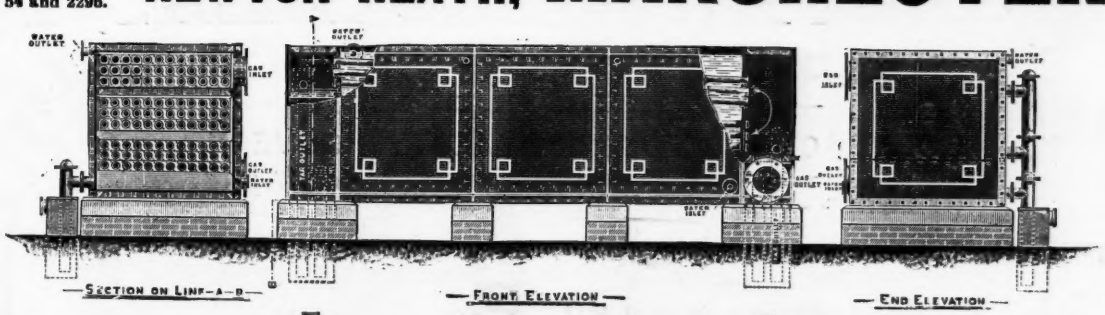

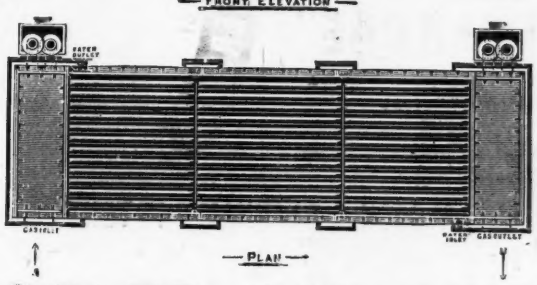
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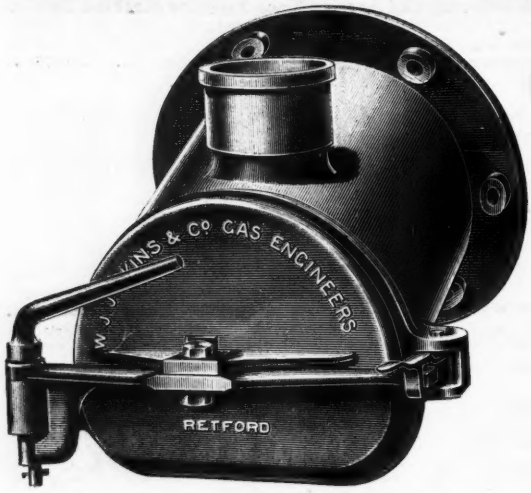

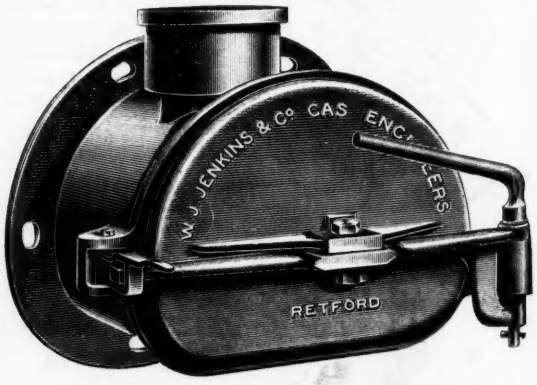

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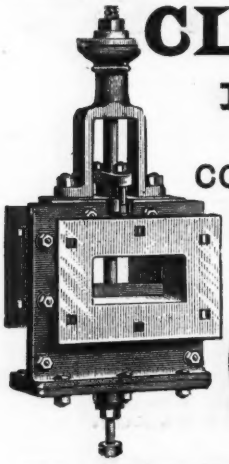

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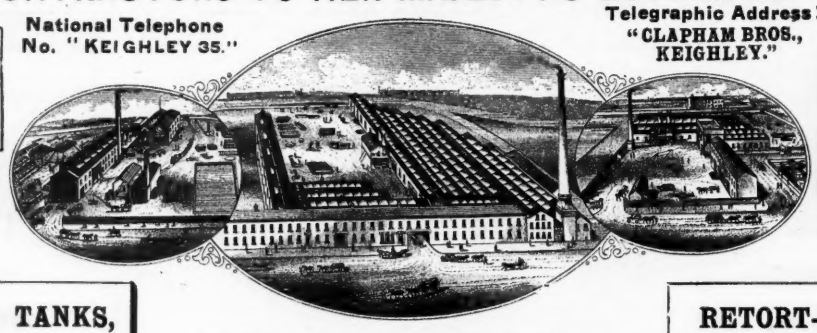

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